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THE

ANATOMY

OF THE

HUMAN BODY.

BY

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VOL. I.

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PREFACE.

THE very favourable reception the Author's former attempt to facilitate the ſtudy of Anatomy met with from the public, has induced him to engage in the preſent work. The book he alludes to, was intended, as its title * gave to underſtand, to convey only a general idea of the ſtructure and functions of the human body. The preſent publication is formed on a different plan, and is deſigned for thoſe who wiſh to enter more minutely into the ſtudy of a ſcience which is very properly conſidered as the

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* Elements of Anatomy and the Animal Oeconomy.

baſis of medical and ſurgical knowlege. That a work of this kind, on account of the many late improvements in anatomical ſcience, has long been a deſideratum in the Engliſh language, will, it is preſumed, be generally acknowleged by all who have had occaſion to apply themſelves to this ſubject. How well the preſent performance is calculated to remedy this defect, the Author leaves to the candid and judicious reader to determine. If the work ſhould be found to have merit, the public will no doubt be diſpoſed to receive it favourably; if it ſhould not, the pains and attention the Author has beſtowed on the ſubject will perhaps not eaſily be admitted as an excuſe for his having added to the number of indifferent books.

As the work is principally deſigned for ſtudents, the Author has endeavoured to be accurate, without being too prolix in his deſcriptions. He has confined himſelf chiefly to the ſtructure of the body; to have introduced too much of phyſiology would have been inconſiſtent with the plan of his work, and have rendered it too voluminous.

ERRATA.

Page 13, line 2 from the top, *for* 'ſeem,' *read* 'ſeems,' P. 66, between l. 2 and 3, *add* 'SECTION II.' P. 20, l. 10, *for* 'enables to walk,' *r.* 'enables *us* to walk.' P. 227, l. 1, *for* 'metarſus,' *r.* 'metatarſus.' P. 258, l. 8, *for* 'which is,' *r.* 'and is.' P. 280, l. 2, *for* 'firſt gave it,' *r.* 'gave it.' P. 407, l. 5, *for* 'metacarpus,' *r.* 'metacarpeus.'

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INTRODUCTION.

THE ſtudy of ANATOMY, according to the uſual acceptation of the term, includes the ſtructure, arrangement, and uſes of all the ſolid parts of the body, and is commonly divided by ſyſtematic writers into the following parts; viz. OSTEOLOGY, MYOLOGY, NEUROLOGY, ANGEIOLOGY, SPLANCHNOLOGY, and ADENOLOGY; which, as may be judged from their etymology, are deſcriptive of the bones, muſcles, nerves, veſſels, viſcera, and glands. To theſe we muſt add a deſcription of the common integuments and their appendages, and then the ſyſtem will be complete.—I ſhall deſcribe each of theſe branches in the order in which I have placed them.

WE may obſerve that all the ſolid parts of the body, as the bones, cartilages, ligaments, membranes, muſcles, tendons, veſſels, nerves, viſcera, common integuments, and nails, are compoſed of fibres, the ultimate diviſions of which are too minute to be traced. All theſe fibres, however, ſeem to vary in length and breadth, as well as in their ſtrength, conſiſtence, and elaſticity, according to the nature of the parts they are intended to compoſe. I ſhall ſay nothing here of their elementary principles and properties, becauſe they are more immediately the objects of phyſiology.

The ſeveral parts that are the reſult of the various combination and arrangement of theſe fibres, are ſo intimately connected with each other, that it is impoſſible to give a full deſcription of any one of them, without being obliged to ſay ſomething of the reſt. It may therefore, perhaps, not be unacceptable to the reader to have ſome little explanation of theſe component parts, as they are called, before he proceeds farther in the work.

Thus we may obſerve that Bones are the firm compact parts, that ſerve as a ſupport to all the other parts, and to give ſhape and firmneſs to the whole machine.

Cartilages are of a leſs compact texture than bones, but of a firmer conſiſtence than any of the other parts of the body. They are ſmooth and elaſtic, and are either placed at the extremities of bones, in order to facilitate the motions of the joints, or to remedy the inconvenience of friction; or they ſerve to ſupport and connect particular parts of the body, as in the larynx for example.

Ligaments are of a looſer texture, and more flexible than cartilages. They are in general formed for connecting the bones, and ſecuring the articulations.

Muscles are the fleſhy parts of the body, and may be conſidered as the means by which all its movements are performed. Anatomiſts, in the generality of muſcles, diſtinguiſh a body or belly part, and two extremities. The belly of the muſcle is compoſed of an infinite number of fleſhy fibres, of a red colour, which every body will underſtand under the name of *fleſh*. The extremities include the ſame number of fibres as the belly part, but they are more firmly united together, and degenerate into a firm, gliſtening, and inſenſible ſubſtance, of a white colour, called *tendon*, if it be round and ſlender; or *aponeuroſis*, if expanded into a broad flat ſurface.

Nerves, which we may conſider as the medium of life and ſenſation, are whitiſh chords, formed of a pulpy, medullary, though ſeemingly fibrous ſubſtance, originating from the brain and medulla ſpinalis, and divided into minute branches, which are diſtributed throughout the body.

The Vessels of the body are of different kinds. Thoſe which originate from the heart, and diſtribute the blood to the ſeveral parts of the ſyſtem, are called *arteries*. Thoſe which convey it back again to the heart are called *veins*, and ſometimes *red veins*, to diſtinguiſh them from another ſyſtem of minute veſſels, called *lymphatic veins*, which abſorb the chyle from the inteſtines, (where they have gotten the name of *lacteals*,) and likewiſe the moiſture that is exhaled into the cavities and cellular interſtices of the body, or that is applied to its external ſurface, all of which they convey into the circulation.

Membranes are the broad, thin expanſions, which we find lining the different cavities, or covering the viſcera, the ſurface of the bones, &c. Some of them have particular names, as the *dura mater*, the *pia mater*, the *perioſteum*, the *peritoneum*, the *pleura*, the *pericardium*, &c.

Under the name of Viscera are included certain parts contained within the cavities of the head, thorax, and abdomen, as the brain—the heart and lungs—the ſtomach and inteſtines, &c.

Glands are uſually divided into *conglomerate* and *conglobate*. The former, as the liver, pancreas, parotids, and kidneys, for inſtance, are intended for the ſecretion of particular humours from the maſs of blood. They appear to be of a compound ſtructure, and to be formed, as it were, of many leſſer glands. The juices they ſecrete being received by a number of minute tubes, theſe at length unite and form one common duct, called the *excretory duct*, which conveys the ſecreted fluid to its proper receptacle. Thus we find the *ductus choledochus*, or excretory duct of the liver, and the excretory duct of the pancreas, opening into the inteſtines; the *ureters*, or excretory ducts of the kidneys, opening into the bladder, &c.

The lymphatic glands (and under this name are included thoſe of the meſentery) are now conſidered as the only *conglobate glands*. They are to be met with in different parts of the body, and are either ſolitary, or in diſtinct cluſters. What change the chyle and lymph undergo in their paſſage through theſe glands, has not yet been aſcertained.

Besides theſe, there are other parts that are conſidered as glandular, but with the ſtructure and uſes of which we are as yet unacquainted; of theſe we have inſtances in the thymus, glandulæ renales, &c.

The veſſels that pour out mucus in different parts are called *follicles*, and are conſidered as ſmall cylindrical tubes continued from the ends of arteries. In ſome parts, as in the tonſils for inſtance, we find many ſuch ſimple follicles folded together in one common covering, and opening into one common ſinus.

All theſe ſeveral component parts ſeem to have one univerſal connecting medium in what is called the *cellular membrane*, or *tela celluloſa*, which is found to inveſt the moſt mibute fibres we are able to trace. Under the ſkin its cells are uſually filled with fat, on which account it has there gotten the name of *membrana adipoſa*; in other parts it is ſometimes called the *reticular membrane*, where it appears like very minute net-work.

The Common Integyments conſiſt of the *epidermis* or ſcarf ſkin, the *rete mucoſum*, the *cutis* or ſkin, and the *membrana adipoſa* juſt now mentioned. The hair and nails may be conſidered as appendages to the ſkin.

BOOK I.

OSTEOLOGY.

CHAP. I.

Of the Bones in general; their ſtructure, articulation, and uſes:—Of the Marrow—Perioſteum—Cartilages—Ligaments—Synovia—Diviſion of the ſkeleton.

THE bones, which are the moſt compact and ſolid parts of the body, ſerve for the attachment or ſupport of all the other parts. From their difference of ſhape, they are commonly divided into two claſſes, of broad and flat bones, and long and round, or cylindrical bones. This may ſerve as a general diſtinction; but the figure of many of the bones is ſo irregular, that it would be impoſſible to attempt an accurate diviſion of this kind.

In the cylindrical bones we may diſtinguiſh three different ſubſtances: 1. Their exterior or bony part, properly ſo called. 2. Their ſpongy cells; and, 3. Their reticular ſubſtance. The firſt of theſe is formed of many laminæ or plates, compoſing a firm, hard ſubſtance. Theſe laminæ are eaſily diſtinguiſhable in bones that have been partly expoſed to calcination, or boiled for any length of time in any ſtrong alcaline ley. In man, and other living animals, they likewiſe ſeparate on expoſure to the air; and hence what is termed *exfoliation* in ſurgery.

In different bones, the arrangement of the bony fibres varies conſiderably. In the flat bones, as in thoſe of the head, for inſtance, they are diſpoſed in the form of rays, and are ſeen ~~converging from~~ shooting from the Centre to the circumference ~~to the centre~~. In the cylindrical bones, they ſeem to be placed in parallel directions. This ſtructure is eaſily obſervable in the bones of the fœtus; the oſſification being then, as it were, only beginning to take place: but even in the adult ſtate, we may demonſtrate it, by macerating a bone in any mineral acid ſufficiently diluted with water. In this caſe, the earthy ſubſtance, which gives firmneſs to the bones, is deſtroyed by the acid, the bone becomes ſoft and pliable, and, on dividing it, we diſcover its laminated ſtructure.

In regard to the means by which the coheſion of theſe laminæ is effected, anatomiſts have greatly differed. Havers, Boerhaave, and others, have attributed it to the glutinous matter contained in the bones. On the other hand, Gagliardi, who made many ingenious inquiries on this ſubject, fancied he had diſcovered an infinite number of claviculi, or bony proceſſes, which he deſcribes as traverſing the laminæ, to unite them together*. There does not ſeem, however, to be any real foundation for this opinion. We know, that the bones conſiſt of an earthy baſis, combined with a glutinous ſubſtance; and that to a due proportion of theſe principles, the bones in a great meaſure owe their ſolidity: we likewiſe know, from the calcination of bones, or the maceration of them in mineral acids, that they are compoſed of fibres differently arranged, the parallel fibres being interſected by others in a lateral direction. But to ſay that theſe lateral fibres have the appearance or the uſes given them by Gagliardi, is altogether repugnant to probability.—The *ſpongy* or *cellular* part of the bones, is ſo called on account of its reſemblance to a ſponge, from the little cells which compoſe it. This ſubſtance forms almoſt the whole of the extremities of cylindrical bones. —The *reticular* part is compoſed of fibres, which croſs each other in different directions. This net-work forms the internal ſurface of thoſe bones which have cavities. The flat bones, as thoſe of the head, are compoſed of only laminæ and the cellular ſubſtance. This laſt is uſually found in the middle of the bone, dividing it into two plates, and is there called diploe.

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* *Inveni eas (laminas) quibuſdam oſſiculis transfixas, qui, claviculorum more, dictas laminas nectebant.* Theſe are his words. He then proceeds to deſcribe four kinds of theſe *claviculi*, or nails, viz. the perpendicular, oblique, headed, and crooked. *Anatome Oſſium.* 4to. Romæ, 1689.

In what manner the bones are firſt formed, whether they are originally cartilaginous or membranous, has long been a matter of diſpute. M. Du Hamel, an ingenious French philoſopher, who made many experiments on this ſubject, is of opinion, that the bones are formed from layers of the perioſteum, which gradually oſſify *. It ſeems he was led to theſe inquiries, by obſerving what takes place in trees; the timber in theſe being formed by the hardening of the alburnum, or white ſubſtance, that is found between the inner bark and the wood †. He contends, that in caſes of fracture, the callus is not formed, as has been generally ſuppoſed, by a ſecretion of oſſeous juices, but by the perioſteum; which after thickening and hardening about the ends of the fractured bone, gradually acquires the conſiſtence of cartilage, and afterwards of bone. M. Du Hamel has endeavoured to ſupport his ſyſtem of oſſification, by feeding different animals with madder and their ordinary food, alternately, during a certain time; and

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* Memoires de l'Acad. des Sciences, 1741, 1742, 1743.

† Dr. Grew, who was likewiſe of opinion that the bones are formed from the perioſteum, has made a ſimilar obſervation, and applied it in the ſame manner as M. Du Hamel has done. See his *Muſ. Reg. Soc.* p. 6.

we are told, that he conſtantly found, on diſſection, not only in the bones, but likewiſe in the perioſteum, diſtinct layers of red and white, which correſponded with the length of time they had lived on madder, or their uſual aliment*. This doctrine has been ſupported by M. Fougeroux, and as ingeniouſly oppoſed by Detleff†, who proves, in the moſt ſatisfactory manner, that the bones only, and not the perioſteum, or even the cartilages, are tinged by a madder diet. Detleff's experiments were made under the direction of Baron Haller, who has taken much pains to refute Du Hamel's opinions on this ſubject. He obſerves ‡, that the ſtructure of the perioſteum is totally different from that of the bones; the latter being of a fibrous, and the former of a cellular texture; and he is convinced, from repeated obſervations, that the firſt rudiments of bone are a glutinous ſubſtance, which quickly aſſumes the conſiſtence of cartilage, and then proceeds more ſlowly to the firmneſs of bone. This proceſs ſeems to be effected by the gradual oſſification of the arteries.

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* The diſcovery of this ſingular property in madder, of tinging the bones of animals of a red colour, has been uſually, and with great juſtice, aſcribed to Mr. Belchier, whoſe experiments on this ſubject were publiſhed in the Phil. Tranſ. for 1736: but Bazanus, who repeated M. Du Hamel's experiments at Bologna in 1742, refuſes Mr. Belchier the honour of this diſcovery, and attributes it to Miſauld, a French phyſician of the 16th century; in whoſe writings, however, the learned M. Portal has not been able to find any traces of this invention.

† Diſſert. Oſſium Calli Generationem et Calli Naturam exhibens, 1753.

‡ Memoire ſur la Formation des Os. 1758, and Element. Phyſ. vol. viii.

Although the perioſteum, as we have ſeen, does not form the rudiments of the bones, yet I have no doubt but it has a greater effect in promoting oſſification than Baron Haller ſuſpected. It is certain, that a multitude of veſſels from the perioſteum enter the ſubſtance of the bones; and it is well known, that in fractures that membrane ſwells and inflames, ſo as ſometimes to be conſiderably thickened. The perioſteum, when thus thickened, is not indeed, as M. Du Hamel ſuppoſes, converted into bone; but it never fails to favour the generation of callus *.

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* In caſes in which there has been a deficiency of callus,

This property in the perioſteum, of promoting oſſification, when accidentally irritated and inflamed, depends upon a certain diſpoſition of veſſels, which it is not eaſy to define with any accuracy, any more than we are able to explain glandular ſecretion, and many other proceſſes of the animal œconomy.

HAVING premiſed theſe few obſervations on the general ſtructure of the bones, let us now proceed to conſider their external appearance. We ſhall find, that in deſcribing the long bones, writers generally ſpeak of their body and extremities. The ancients diſtinguiſhed the body, or middle part, by the name of diaphyſis, and divided the extremities into apophyſis and epiphyſis. An apophyſis, or, as it is more uſually termed, proceſs, is an eminence or continuation of the body of the bone; whereas an epiphyſis is a part attached to the bone, by means of

lus, irritating the perioſteum has excited a growth of new bone: and Signor Troja, an ingenious ſurgeon at Naples, has lately publiſhed ſome experiments, which prove, that by lacerating the perioſteum, we may at pleaſure fill the cavity of a bone with callus. See his *De Novorum Oſſium Regeneratione Experimenta.* 1775.

an intervening cartilage. A great number of epiphyſes, which in young ſubjects appear as ſeparate bones, become, in the progreſs of time, ſo perfectly united to the body of the bone, by the oſſification of the cartilage, as not to be diſtinguiſhed from it in the adult ſtate. The oſſification is generally complete about the fifteenth year; ſometimes, however, we find the extremities of bones ſtill in the ſtate of epiphyſis at the age of eighteen, and even twenty years.

Different names are given to the proceſſes of bones, varying according to their figure and ſize. If a proceſs is large, and of a ſpherical ſhape, it is called ſpheroid, and ſometimes caput, or head. If the head is flatted, it takes the name of condyle. Other proceſſes are called maſtoid, ſtyloid, coracoid, from their reſemblance to a breaſt, a ſtiletto, or the beak of a crow. Some are ſtyled ridges, or ſpines; others derive their names from their ſituation, as is the caſe with the longitudinal, perpendicular, oblique, and tranſverſe proceſſes. Thoſe which we ſhall ſpeak of in deſcribing the os femoris, and which are called trochanters, are the only proceſſes whoſe names correſpond with their uſes.

There are in bones, cavities, as well as proceſſes. Theſe cavities either extend quite through the bones, or appear only as depreſſions. The firſt of theſe receive the name of foramina, or holés; and theſe foramina are ſometimes called canals, or conduits, according to their form and extent. Of the cavities which do not penetrate through the bones, ſome are called cotyloid, when they are deep, as the great articulating cavity of the thigh with the os innominatum. Glenæ, or glenoid, when they are ſuperficial, as the cavity of the ſcapula, which receives the head of the os humeri.

Of the depreſſions which are not uſeful in articulation, the largeſt, and thoſe which are not equally ſurrounded by high brims, are called foſſæ. On the contrary, cavities within the ſubſtance of the bones, with ſmall apertures, are termed ſinuſes; broad, but ſuperficial depreſſions without brims, ſinuoſities;

ties; and long narrow canals formed in the ſurface of the bone, furrows.

Of the Articulation of the Bones.

THE ſkeleton * is compoſed of a great number of bones, which are all ſo admirably conſtructed, and with ſo much affinity to each other, that the extremity of every bone is perfectly adjuſted to the end of the bone with which it is connected; and this connection is termed their *articulation*. Anatomiſts diſtinguiſh three kinds of articulation: The firſt they name Diarthroſis, the ſecond Synarthroſis, and the third Amphiarthroſis.

THE Diarthroſis, or moveable articulation, is ſubdivided into four kinds: 1. Enarthroſis, when a large head is received into a deep cavity, as is the caſe with the head of the os femoris. 2. Arthrodia, when a round head is admitted into a ſuperficial cavity, as in the articulation of the arm-bone with the ſcapula: both theſe allow motion to all ſides. 3. Ginglimus (which properly ſignifies the hinge of a door or window), when the articulation allows only of flexion and extenſion, as in that of the tibia with the os femoris. In this the parts of the bones mutually receive, and are received. 4. The Planiform, when the articulation is by means of ſurfaces that are flat, or nearly ſo, and which, of courſe, allow only of very obſcure motion. Of this we have an inſtance in the articulation of the bones of the metacarpus with each other, and with the bones of the carpus.

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* The word ſkeleton, which by its etymology implies ſimply a dry preparation, is uſually underſtood to be an aſſemblage of all the bones of an animal, united together in their natural order. There are two kinds of ſkeletons, the natural, and the artificial. In the former, the bones are connected together by their own proper cartilages and ligaments; whereas in the latter, they are joined together by artificial means,

The Synarthroſis, or immoveable articulation of bones, is divided into the ſuture and gomphoſis. In the ſuture, the two bones are mutually indented into each other; and of this we have an example in the junction of the parietal bones. When the marks of this articulation were more minute, the ancients gave it the name of *harmonia*; but this variety of names ſeem to be uſeleſs. Gomphoſis is the fixing one bone into another, as a nail is fixed into a board; thus the teeth are ſecured in their ſockets.

The Amphiarthroſis, or mixed articulation, is ſo called from its partaking both of the diarthroſis and ſynarthroſis. We have an inſtance of this kind of articulation in the bodies of the vertebræ, which, though ſeemingly firmly connected with each other by the intervening cartilages, are, however, capable of a variety of motion.

The perfect union, or concretion of two bones, is called ſymphyſis, as in the lower jaw, which in infancy is compoſed of two diſtinct bones, but becomes one in a more advanced age, by the oſſification of the uniting cartilage.

When bones are thus joined by the means of cartilage, the union is ſtyled Synchondroſis. It is in this manner that the oſſa pubis are united, that the ribs are joined to the ſternum, and the vertebræ to each other. When ligaments are the connecting bodies, as they are in all the moveable articulations, the articulation takes the name of Syneuroſis.

Of the Marrow.

THE generality of writers diſtinguiſh two ſubſtances in the cavities of bones: to one of theſe they give the name of marrow, and to the other that of medullary juice. Theſe two ſubſtances, however, are preciſely of the ſame nature, differing only in colour and conſiſtence from accidental cauſes. The former, or marrow, properly ſo called, which is found only in the great cavities of long bones, is a ſoft ſubſtance, reſembling fat, and inclining to a yellowiſh tinge; whereas the medullary juice is more fluid, of a red colour, and confined to the cells in the ſpongy part of the bones.

Both theſe ſubſtances, which we ſhall deſcribe under the common name of marrow, are included in a very fine and tranſparent membrane, which may eaſily be demonſtrated in the great cavities of the round bones, to the inner ſurface of which it is attached by filaments and blood veſſels. This *membrana medullaris* *, as it may be called, forms an infinite number of veſicles † for containing the marrow, which is likewiſe ſupported in the cavities of the bones, by the bony filaments of their reticular ſubſtance, or, as it is more uſually called, their *cancelli*.

This membrane is ſupplied with a great number of minute arteries, which ramify along it ſurface, and paſs into its cells, where they ſeem to depoſit the medullary ſubſtance. Theſe arteries, as well as its veins, are derived chiefly from the perioſteum, and paſs through the bones by proper canals.

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* Almoſt all the old anatomiſts, and even many of the lateſt writers, particularly M. Petit, in his edition of Palfyn, have deſcribed a perioſteum internum as lining the internal cavities of bones. It is certain, however, that no other membrane exiſts within the bones than this which is deſtined for the marrow, and which has probably given riſe to the miſtake.

† By ſtirring a portion of marrow in warm water, we eaſily ſeparate the oily ſubſtance from its membrane, and may then inflate the cells of the latter, by means of a common blow-pipe.

But beſides theſe veſſels from the perioſteum, there are others which paſs in chiefly near the extremities of the long bones, and not only enter the cells of the marrow, and ramify upon its membrane, but likewiſe ſend off branches, which turn back again into the bone, and thus paſs from within outwards. This mechaniſm may ſerve to explain why, when, by a fracture, or any other accident, part of a bone is deprived of the ſupply of blood from its ſurface, the deficiency may be made up by theſe branches from the medullary arteries.

There are no nerves to be demonſtrated in the marrow; and on this account many writers, and particularly Haller, have denied it ſenſibility, eſpecially as it ſeems to be analogous to fat*. But it is hardly allowable to draw ſuch a concluſion from analogy, as nerves may exiſt in this, as well as in other parts, and yet be ſo minutely divided as to eſcape the eye of the anatomiſt. Duverney †, who repeatedly plunged a probe into the thigh bone of a living animal, aſſures us that the animal conſtantly afforded ſigns of great pain[*]. I am of opinion, however, from ſome experiments I have been able to make in this way, that the marrow, or rather the membrane in which it is included, poſſeſſes but an obſcure degree of feeling in a ſound ſtate, although it be not perfectly inſenſible. Galen, and all the writers after him till the time of Fallopius, were of opinion, that the marrow ſerves for the nouriſhment and renewal of the bones; and this doctrine has lately been revived by M. Lieutaud[†], M. Petit[‡], and others.

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* Mem. ſur les Parties ſenſibles, &c. tom. i p. 26.

† Mem. de l'Acad. des Sciences, 1700.

It is certain, however, that the marrow receives no tinge from the uſe of madder, any more than the cartilages and perioſteum; and its uſe ſeems to be, not to nou-

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[*] Deventer, who repeated the ſame experiment, aſſerts the ſame thing in his work entitled *Van de Ziektens der beenderen*, &c.

[†] Eſſais Anatomiques.

[‡] See his edition of Palfyn's Anatom. Chir. vol. i. p. 11.

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riſh the bones, but to diminiſh their brittleneſs. It is inſinuated between the plates even of the hardeſt parts of the bones, and this probably by means of certain canals, the exiſtence of which Havers ſeems rather to have conjectured than demonſtrated *. The tranſudation of the oil through the bones of a ſkeleton, ſeems to prove that ſome ſuch paſſages do actually exiſt; and after burning a portion of a round bone in order to deprive it of its oil, we may, by breaking it, obſerve minute channels which are probably deſtined for this purpoſe; but they are neither ſo regular in their appearance, nor ſo ſatisfactorily demonſtrated as Havers has pretended.

Several anatomiſts have likewiſe had a notion that the marrow tranſudes through the cartilages, which cover the extremities

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* In his *Novæ quædam Obſervationes de Oſſibus*, he deſcribes theſe canals by which the marrow is conveyed through every part of the ſubſtance of the bones, and divides them into longitudinal and tranſverſe ones. He ſpeaks of the firſt as extending through the whole length of the bone, and of the latter, as the paſſages by which the longitudinal ones communicate with each other.

of bones, and thus is mixed with the ſynovia. In proof of this it is obſerved* that butchers, upon ſeeing the greater or leſſer quantity of marrow in the bones of cows, can tell whether they have travelled far or little before they were ſlaughtered. It has likewiſe been obſerved, that but little marrow is found in the bones of people who die of lingering diſeaſes. But this latter obſervation may be explained in a different manner: we know that the marrow has all the properties of fat, and like that may be taken up by the abſorbents in a greater quantity than it is ſecreted. We are indeed not able to demonſtrate lymphatics in the bones, but the ſwellings of lymphatic glands, which have been obſerved to take place in certain affections of the bones, is a ſufficient proof of their exiſtence.

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* Monro on the Bones, p. 20.

Of the Perioſteum.

THE perioſteum is the name given to the membrane that covers the bones. It is deficient only where ligaments or tendons are attached to bones, and in the parts of the teeth that are above the ſockets.

The ancients erroneouſly conſidered it as a production of the dura mater; and ſome late writers, as we have ſeen, have with as little reaſon ſuppoſed the bones to be originally formed by the oſſification of this membrane.

It is of a compact, cellular texture, and adheres very cloſely to the ſurface of the bones, by means of blood-veſſels, and of a great number of minute threads, which appear to be of a ligamentous nature. It is evidently reflected from one joint to another, and may be conſidered as a common covering of the bones; ſo that were it poſſible to deſtroy them without injuring their perioſteum, we ſhould have a ſeries of membranous bags correſponding with the ſhape of the ſkeleton.

The chief uſes of this membrane ſeem to be, to give a ſmoothneſs to the bones, ſo that the muſcles may ſlide eaſily upon their ſurface; to connect the numerous pieces of which the bones in young animals conſiſt; to unite the epiphyſes more firmly to the bodies of the bones; to ſtrengthen the articulations by extending over the ligaments of the joints; to ſupport the veſſels in their paſſage to the bones; and perhaps, laſtly, to ſerve for the ſecretion of the oſſeous juices.

Of the Cartilages.

CARTILAGES are white, gliſtening, ſmooth, and elaſtic ſubſtances, not ſo hard as the bones, but of a firmer conſiſtence than any of the other parts of the body.

The greater part of them, and thoſe we mean to ſpeak of at preſent, are intimately connected with the bones; but there are others, as thoſe of the larynx, which are intended for other purpoſes, and which will be deſcribed in their proper places.

The Cartilages ſubſervient to bones may be diſtinguiſhed, 1. into thoſe which incruſt the ends and cavities of ſuch bones as are deſigned for motion; 2. thoſe which increaſe the extent of particular bones, as is the caſe with the cartilages of the ribs; 3. thoſe which ſerve to unite bones together, as is the caſe with the cartilages uniting the vertebræ and the oſſa pubis.

Many of the cartilages oſſifying in proceſs of time, a greater number are obſerved in the fœtus than in the adult. From the ſame cauſe the number of bones too is greater in young than in old people; becauſe it happens that a cartilage, placed between two bones, oſſifies, and the three parts, which were before diſtinct, unite together.

Cartilages receive no tinge from the uſe of madder, nor can we demonſtrate their veſſels by injection.—When we perceive the leaſt mark of redneſs in a cartilage, we may be aſſured that an oſſification has taken place. This oſſification begins in the centre of the cartilage, and at firſt exhibits the appearance of an oſſeous artery, which is white and opaque *, and regularly ramified. What induces this change in the ſtructure of the cartilage, and this ſecretion of oſſeous juices, we are not yet able to determine. In this, as in many other parts of anatomy, we muſt long content ourſelves with obſerving appearances before we can undertake to explain them.

The elaſticity of the cartilages renders it probable that they are of a fibrous ſtructure, but it is very difficult to demonſtrate this ſatisfactorily. Dr. Hunter, who has made

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* A late writer in the Edin. Med. Comm. ſpeaks of this oſſification of arteries, in cartilages, as a new diſcovery; but the whole proceſs is very accurately deſcribed by Neſbit, in his *Oſteogeny*, which was publiſhed in 1736.

many ingenious inquiries on this ſubject [*], has deſcribed two ſorts of fibres in the cartilages of the joints; the firſt of theſe he tells us are very ſhort parallel fibres, which ariſe from the bone, and terminate on the ſurface of the cartilage; and the others are placed in a tranſverſe direction. He has likewiſe deſcribed a very fine membrane which is ſpread over the ſurface of the cartilages, and is a continuation of the internal lamina of the capſula of the joints [†]. Externally, the cartilages, at the extremities of bone, are in many inſtances covered by the perioſteum, which was here by the ancients, and is ſtill by many writers, called *perichondrium*.

Of the Ligaments.

LIGAMENTS are white, gliſtening ſubſtances, of a compact fibrous texture, difficultly ſtretched or torn, and poſſeſſing but little elaſticity. The greater number of them ſerve to connect the bones and ſtrengthen the articulations, but there are others which belong more immediately to the ſoft parts, and which of courſe will be deſcribed hereafter.

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[*] Phil. Tranſ. for 1743.

[†] Ibid.

The Ligaments of the joints are of different kinds.--Thoſe which ſurround the whole joint like a purſe are called *burſal* or *capſular* ligaments. Theſe, which are to be met with in all the moveable joints, ſerve to ſtrengthen the articulation, but their chief uſe ſeems to be to confine the ſynovia within the cavity of the joints.—In ſome joints we find bands of ligamentous fibres covering only certain parts, chiefly the ſides, of the joint, and in this caſe they are called *lateral* ligaments. Theſe lateral ligaments ſerve to regulate the motions of the joint, and, as well as the capſular ligaments, are covered externally by the perioſteum.—We meet with ligaments in the cavities of joints, only in the articulation of the os femoris with the os innominatum, and in the joint of the knee. In the former we obſerve a ſtrong ligament paſſing from the round head of the os femoris to the lower internal part of the receiving cavity. This ligament is commonly, though very improperly, called the *round* one, it being in fact flat and of a triangular ſhape.—In the knee joint we find two ligaments which, from their ſituation with reſpect to each other, are called *croſs* ligaments.

All the ligaments of the bones, however, are not confined to the articulations. Thus we find a ligamentous ſubſtance running along between the radius and the ulna in the fore arm, and between the tibia and fibula in the leg. In theſe places it takes the name of *interoſſeous ligament.* As we proceed in our inquiries we ſhall have occaſion to deſcribe other ligaments, which ſerve for the attachment of muſcles and other purpoſes.

The ligaments are furniſhed with a conſiderable number of blood veſſels, ſo that our injections readily paſs through every part of their ſubſtance, but we are not able to demonſtrate their nerves.

Of the Synovia.

WITHIN the cavities of the joints we ſind an unctuous, mucilaginous liquor, which in an healthy ſtate coagulates neither with heat nor with acids. This mucilage, which is called *ſynovia*, ſerves to lubricate the cartilages and ligaments, and thus facilitates the motion of the joints. The organs which ſecrete this fluid are of a glandular ſtructure[*], and are placed in ſmall cavities in the articulations, ſo as to be capable of being gently compreſſed by the motion of the joint, which expreſſes their juice in proportion to the degree of friction. By macerating them in water we may obſerve their minute excretory ducts incloſed in one common membrane and hanging looſe like ſo many fringes within the joint.

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[*] I am aware that ſome anatomiſts are of opinion that theſe appearances in the joints are nothing more than aſſemblages of fat. This notion, which is erroneous, has been adopted by M. Lieutaud.—Havers, though not the diſcoverer as he ſuppoſed, was the firſt accurate deſcriber of theſe glands, and therefore they are ſometimes called *Glandulæ Haverſianæ*.

This ſtructure prevents a regurgitation of the fluid *. But beſides theſe glands, which are ſituated in depreſſions of the articulation, we meet with ſimple follicles, in different parts of the capſular ligament, which likewiſe pour out a mucilaginous fluid for the ſame purpoſe. In the joints, as in all the other cavities of the body, the redundant moiſture is taken up and carried back into the ſyſtem by lymphatics; ſo that from a defect in theſe abſorbent veſſels, or other cauſes, there may be a morbid collection of fluid within the cavity, and hence a dropſy of the joint.

Diviſion of the Skeleton.

THE human ſkeleton is generally divided into the head, the trunk, the ſuperior and the inferior extremities.

THE firſt diviſion includes the bones of the cranium and face.—The bones of the trunk are the ſpine, ribs, ſternum, and bones of the pelvis. The upper extremities on each ſide contain the two bones of the ſhoulder, viz. the ſcapula and clavicle; the bones of the arm, fore-arm, and hand. The lower extremities on each ſide of the trunk, conſiſt of the thigh bone, and the bones of the leg and foot.

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* Morgagni Adverſar. II. p. 52.

CHAP. II.

Of the Bones of the Head.

THE bones of the head may be divided into thoſe of the cranium and face. Each of theſe diviſions ſhall be the ſubject of a ſection.

SECTION I.

Of the Bones of the Cranium.

THE CRANIUM is of a ſpherical ſhape, flattened, however, at the ſides, and ſomewhat wider behind than before. Its greateſt diameter is from the forehead to the occiput. Its upper part is called *vertex*, or crown of the head; its anterior or fore part, *ſinciput*, or forehead; its poſterior or hind part, the *occiput*; its ſides the *temples*; and its inferior part the *baſis*.

IT is compoſed of eight bones, viz. the coronal bone or os frontis; the two parietal bones or oſſa bregmatis; the os occipitis; the two temporal bones; the ſphenoid bone; and the os ethmoides or cribiforme.—Of theſe, only the parietal and occipital bones are to be conſidered as proper to the cranium;

nium; the five others not only ſerving to incloſe and protect the brain, but likewiſe to form the face.

Some anatomiſts, in order to account for the ſpherical ſhape of the cranium, have ſuppoſed that the bones are diſpoſed to oſſify in a particular manner; but as the brain and cerebellum are to be ſeen in the fœtus before any oſſification has taken place, we may rather ſuppoſe that theſe ſerve as a model on which the bones are formed. This appears the more probable when we conſider the various depreſſions within the cranium which correſpond with the lobulated appearance of the brain, and the ramifications of the veſſels on its ſurface.—Externally we obſerve that the ſides of the cranium are flattened at the temples; and this ſeems to be chiefly owing to the action of the temporal muſcles, the ſpherical ſhape of the head being more perfect in children than in adults. When I viſited the learned Profeſſor Camper in Weſt Frieſland, he did me the favour to ſhew me the ſcull of a Calmuck Tartar, in which I obſerved the ſurface for the temporal muſcle to be much broader than in Europeans, and the ſides of the head were ſo flattened that the ſagittal ſuture was formed into a ridge.

The ſhape of the ſcull is found to vary in people of different nations. Thus, in the generality of Europeans it is oblong; in the Turk and Algerine it is round; and in the Chineſe and Tartar it is broad. Veſalius* and others have attributed this variety to the management of children when very young, ſuppoſing that the head of a Turk is rounded by an early uſe of the turban, while that of an Engliſhman is flattened by the chin ſtay. But Profeſſor Camper, who has been at immenſe pains to collect ſculls from many different parts of the world, ſuppoſes, with good reaſon, that this difference in their ſhape is occaſioned, not by any ſuch accidental means as Veſalius and others ſince his time have imagined, but by natural cauſes with which we are as yet unacquainted.

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* Lib. i. cap. v.

In the fœtus all the bones of the cranium are perfectly diſtinct from each other; and each bone is compoſed of a ſingle lamella, the fibres of which are diſpoſed like rays diverging from a centre. The oſſification begins in the middle of every bone, and proceeds gradually to the circumference; ſo that this proceſs, and of courſe the increaſe of the head, is carried on from an infinite number of points at the ſame time, and the bones conſequently approach each other in the ſame proportion. Soon after birth the bones acquire greater thickneſs, and begin to be compoſed of two tables and of an intermediate cellular ſubſtance called *Diploe.* The circumference of each gradually acquires the ſame conſiſtence as the reſt of the bone, and their fibrous texture entirely diſappears. As the bones join each other, their edges uſually become mutually indented, like the teeth of a ſaw, ſo as to form the different ſutures. Theſe are five in number, and are diſtinguiſhed by the following names, viz. the coronal, ſagittal, lambdoidal, and two ſquamous ſutures.

The *Coronal* ſuture, which joins the os frontis to the anterior edge of the oſſa parietalia, has gotten its name from its being near the place where the ancients wore their *Vittæ Coronæ* or garlands.—It is indented in its upper part, but towards each end we uſually find it ſmooth.

The *Sagittal* ſuture extends in a longitudinal direction along the middle and upper part of the ſcull, and generally terminates at the middle of the coronal and lambdoidal ſutures. When compared with the coronal ſuture it is ſuppoſed to reſemble an arrow placed upon a bow, and hence it has gotten its name. This ſuture is in many ſubjects continued through the middle of the os frontis down to the root of the noſe. Veſalius [*], and ſome others, relate inſtances of its being continued as far back as the foramen magnum of the occipital bone. Fallopius [†] however contends that this never happens, and it does indeed appear to be very improbable, when we conſider that the os occipitis is formed only of one piece, and not of two pieces like the os frontis. Riolanus [*] tells us that Sylvius was in poſſeſſion of a ſcull in which there were two ſagittal ſutures at about the diſtance of a finger's breadth from each other.

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[*] Lib. i. cap. v.

[†] Expoſ. de Oſſibus.

The *Lambdoidal* ſuture, ſo called from its ſuppoſed reſemblance to the Greek letter Λ, connects the poſterior edges of the parietal bones with the upper edges of the os occipitis. It is ſometimes very irregular, being made up of a great many ſmall ſutures, which ſurround ſo many little bones called *oſſa triquetra*, though improperly, as they are not always of a triangular figure. They have likewiſe been called *oſſa Wormiana* by ſome writers, though they were known and deſcribed by ſeveral anatomiſts long before the time of Olaus Wormius. The number, ſhape, and ſituation of theſe bones are very irregular. They are generally larger and more conſpicuous on the external, than on the internal ſurface of the ſcull. Perhaps their ſize and extent in ſome particular ſubjects may, through miſtake, have given riſe to the obſervation we juſt now mentioned, of the ſagittal ſuture's being continued through the os occipitis. Theſe little bones are not always confined to the lamboidal ſuture, but are ſometimes found in the ſagittal and coronal ſutures. Their formation ſeems to be merely accidental, from the oſſification beginning from different points of the ordinary bones of the cranium at the ſame time.

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[*] Comment. de Oſſibus.

The *Squamous*, or as they are ſometimes called, the *falſe ſutures*, are one on each ſide where the temporal bone is joined to the parietal. They are called *ſquamous*, from their being placed like one ſcale upon another. In general, we do not obſerve the inequalities of this ſuture till the bones are ſeparated, except at its poſterior part, which, on account of its being conſtantly ſerrated like the other ſutures, has been deſcribed by Albinus * as a diſtinct ſuture, under the name of *additamentum poſterius ſuturæ ſquamoſæ*. Monro † once ſaw two ſquamous ſutures on the ſame temple, with a ſemicircular piece of bone between them.

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* De Oſſibus. † On the Bones.

Besides theſe there are five other ſutures which are common both to the cranium and face, viz. the *ethmoidal* and *ſphenoidal* ſutures, which ſurround the bones of thoſe names; the two *zygomatic* ſutures, one on each ſide, which unite the oſſa malarum to the temporal bones; and laſtly, the *tranſverſe* ſuture, which extends from one temple to the other, and is common to the os frontis, the oſſa malarum, the oſſa unguis, the oſſa maxillaria ſuperiora, and the oſſa naſi.

All theſe ſutures are evidently an effect of the particular manner in which the bones of the cranium oſſify. Like the oſſa triquetra, they are more ſtrongly marked on the outſide than on the inſide of the ſcull. As the oſſification becomes complete they gradually diſappear, ſo that in old people there are ſometimes no traces of them remaining. This rule however is not without exception; for there have been inſtances of the coronal and ſagittal ſutures being entirely obliterated in children of only eight years of age*, while they are ſometimes, though very rarely, found perfect even in very old ſubjects.

The chief uſes ariſing from this partition of the cranium into ſo many pieces, ſeem to be to facilitate the oſſification in the manner we have already obſerved; and likewiſe to favour the excluſion of the fœtus, by accommodating the ſhape of the head to the paſſage of the pelvis.

Besides theſe, the ſutures ſeem to have other, ſecondary uſes; thus they perhaps ſerve in ſome meaſure to prevent the ſpreading of fractures from one bone to another. I am aware that Ruyſch†, and others ſince his time, have denied the poſſibility of any ſuch effect. But the truth in this caſe ſeems to be, that although, when the bones are completely oſſified, and firmly united, the fracture is not abſolutely interrupted by the ſutures, yet in many caſes they may prevent its ſpreading ſo far as it would otherwiſe do.

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* Mem. de L'Acad. des Sciences, 1730.

† Adverſar. Anatom.

I have ſeen more than one inſtance in which this effect ſeemed to have taken place, and it is certain that in young ſubjects the ſutures may be of ſtill greater utility in this reſpect.

The dura mater ſeems likewiſe to be better ſupported in children by means of theſe openings; for although that membrane adheres every where to the inner ſurface of the cranium by means of veſſels and fibres, in the ſame manner as the pericranium does to the outer ſurface of the ſcull, yet theſe veſſels are conſtantly larger and more numerous at the ſutures than elſewhere. There is no foundation however for ſuppoſing, as many of the older writers, and even ſome of the moderns *, have done, that there is a tranſpiration of ſteams from the brain through the ſutures, although this was for a long time a favourite doctrine. But the reader will no longer wonder at this, when he is told that the oſſa triquetra were long held in high eſtimation as a ſpecific for the epilepſy.

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* Keill's Anatomy.

Of the Os Frontis.

THE Os Frontis is of a ſemicircular ſhape, and, when detached from the other bones of the cranium, has ſome reſemblance to the ſhell of the cockle. Externally, where it forms the forehead, it is ſmooth and convex; but below, where it helps to form the orbits of the eyes, it affords ſeveral proceſſes and cavities. Its inner and concave ſide is turned towards the brain, from the impreſſions of which, and of the arteries of the dura mater, its ſurface is rendered unequal, eſpecially at the lower part of the bone, over the orbit, where the weight of the brain, from our erect poſture, has the greateſt effect. This bone, in the generality of ſubjects, is of conſiderable thickneſs and great ſtrength, except at that part of the orbit of the eye which is neareſt to the noſe; and where, by the action of the eye on one ſide, and the preſſure of the brain on the other, it is rendered ſo exceedingly thin, eſpecially in old people, that a wound in the eye, by a ſword or any other pointed inſtrument,

ſtrument, is ſometimes productive of immediate death, by penetrating the brain.

In conſidering the exterior ſurface of the bone, it will be right to diſtinguiſh its proceſſes. Of theſe, the moſt remarkable are thoſe portions of the bone on each ſide that form the orbits, or cavities in which the eyes are placed. Theſe are called *orbitar proceſſes*; and they differ from the other parts of the bone, not only in being compoſed of a very thin bony lamella, but likewiſe in being concave externally. The ſuperior border of each orbit is formed into a ridge, which we ſee extended in form of an arch. On this the eye-brows are placed. It is called the *ſuperciliary ridge*, and in ſome meaſure covers and defends the globe of the eye. At each end of this ſuperciliary ridge the bone juts out to form two proceſſes, which, from their ſituation, are called the *external* and *internal angular proceſſes*. Of theſe, the internal angular proceſs, or that which is neareſt the noſe, is the leaſt conſiderable. In each orbit, behind the middle of the ſuperciliary ridge, a conſiderable depreſſion is ſeen, in which the lachrymal gland is lodged; and behind each internal angular proceſs, near the noſe, we may obſerve a ſmall pit where the cartilaginous pully of the muſculus obliquus ſuperior is fixed.—At the bottom of the os frontis, between the internal angular proceſſes, ariſes a ſmall protuberance, called the *naſal* proceſs, from its ſupporting the bones of the noſe; but, in order to demonſtrate it, it is neceſſary that theſe ſhould firſt be removed.—Behind each external angular proceſs we find the ſurface of the bone conſiderably depreſſed, where ſome part of the temporal muſcle takes its origin; and in the anterior part of the os frontis, there is a conſiderable diſcontinuation of it, which is filled up by the cribiform part of the os ethmoides. The principal foramina or holes to be obſerved on the external ſurface of the os frontis are, 1. The ſuperciliary or orbitar foramen, which in many ſubjects is only a notch inſtead of a hole. We find it in each ſuperciliary ridge, a little removed from its middle towards the noſe. Through it paſſes a ſmall artery from the internal carotid, together with a minute branch of the fifth pair of nerves, to be diſtributed to the muſcles and teguments of the forehead. 2. The internal and anterior orbitar foramen, which affords a paſſage to a branch of the ophthalmic artery, and a ſmall twig of the fifth pair of nerves. This hole is to be ſeen near the middle of the inſide of each orbit, and is ſometimes common to the os ethmoides. 3. The internal and poſterior orbitar foramen, which is ſmaller than the former, and about an inch deeper in the orbit. Through it a ſmall branch of the internal carotid paſſes to the noſe.—Beſides theſe there are other ſmaller holes, more in ſome ſubjects than others, which ſerve for the tranſmiſſion of ſmall arteries or nerves.

The internal view of this bone affords us an elevation in form of a ridge, which has been called the *ſpinous* proceſs; it paſſes from the anterior to the poſterior part of the bone, dividing it into two conſiderable foſſæ, in which the anterior lobes of the brain are placed. In this ridge we commonly find a narrow furrow, to which is attached the extremity of the falx, as the membrane is called, which divides the brain into two hemiſpheres. At the bottom of the ridge we obſerve a ſmall hole, which in ſome ſubjects is proper to the os frontis, and in others is formed by the junction of this bone with the os ethmoides. It uſually opens into the cavities of the noſe, and tranſmits a ſmall artery and ſometimes a vein.

Besides theſe two foſſæ, there are many depreſſions, which appear like digital impreſſions, and owe their formation to the prominent circumvolutions of the brain.

In young ſubjects, the forehead is formed of two diſtinct bones; ſo that in them the ſagittal ſuture extends from the os occipitis to the noſe. This ſeparation ſometimes, though rarely, continues through life.

The two tables, of which this bone is almoſt every where compoſed, ſeparating from each other between the orbits, form two cavities, one on each ſide of the face, called the frontal ſinuſes. Theſe cavities do not exiſt in young ſubjects, but are gradually formed as the os frontis acquires a greater thickneſs and conſiſtence. They are ſeparated by a thin bony partition, and open by two ſmall holes into the noſtrils, of which in fact they form a part, being lined with the ſame pituitary membrane that lines the other cavities of the noſe, and ſerving to ſecrete a mucous fluid which is conſtantly diſtilling into the noſtrils. It is from the deficiency of theſe cavities that the foreheads of children are ſo much flatter than thoſe of adults, and the ſame rule may enable us to judge of the difference of their ſize in different ſubjects.—Sometimes one of theſe ſinuſes is more capacious than the other, and now and then, though very rarely, the two cavities communicate. It is ſtill more unuſual for them to be entirely wanting.—Of their uſes we ſhall have occaſion to ſpeak more particularly when we come to deſcribe the other parts of the noſe.

The os frontis is connected above with the two parietal bones; and below, or at its ſides, with the os ſphenoides, the os ethmoides, the os unguis, the oſſa maxillaria,

ria, the oſſa naſi, and the oſſa malarum.—Its uſes are to form a part of the cranium and face, to defend and ſupport the anterior lobes of the brain, to form a great part of the orbits, and to enlarge the organ of ſmelling.

Of the Oſſa Parietalia.

THESE bones, which are two in number, compoſe the ſuperior arch and lateral parts of the cranium, ſo as to form a kind of vault. Each of theſe bones forms an irregular ſquare. They are thicker above than below; but are ſomewhat thinner, and at the ſame more equal and ſmooth than the other bones of the cranium. The only foramen we obſerve in them, is a ſmall one towards the upper and poſterior part of each. It has been named the parietal foramen, and ſerves for the tranſmiſſion of a ſmall vein to the longitudinal ſinus. In many ſubjects this foramen is wanting.—On the inner ſurface of theſe bones we obſerve the marks of the veſſels of the dura mater, and of the convoluted ſurface of the brain. On the inſide of their upper edge we may likewiſe obſerve a conſiderable furrow, which correſponds with the longitudinal ſinus of the dura mater; and lower down, towards their poſterior and inferior angle, is a ſmaller one for part of the lateral ſinuſes.

These bones are joined to each other by the ſagittal ſuture; to the os ſphenoides and oſſa temporum by the ſquamous ſuture; to the os occipitis by the lamboidal ſuture; and to the os frontis by the coronal ſuture.—Their connection with this latter bone is well worthy our attention. We ſhall find that in the middle of the ſuture, where the os frontis, from its ſize and flatneſs, is the moſt in danger of being injured, it reſts upon the arch formed by the parietal bones; whereas at the ſides, the parietal bones are found reſting upon the os frontis, becauſe this ſame arch is there in the greateſt danger from preſſure.

In new-born infants the oſſa parietalia are ſeparated from the middle of the divided os frontis by a portion of the cranium, then unoſſified. When the finger is applied to this part *, the motion of the brain, and the pulſation of the arteries of the dura mater may be eaſily diſtinguiſhed. In general the whole of this part is completely oſſified before we are ſeven years of age.

Of the Occipital Bone.

THIS bone, which forms the poſterior and inferior part of the ſcull, is of an irregular figure, convex on the outſide, and concave internally.

Its external ſurface, which is very irregular, ſerves for the attachment of ſeveral muſcles. It affords ſeveral inequalities, which ſometimes form two ſemi-circular hollows ſeparated by a ſcabrous ridge. The inferior portion of the bone is ſtretched forwards in form of a wedge, and hence is called the *cuneiform* proceſs. At the baſe of this proceſs, ſituated obliquely on each ſide of the foramen magnum, are two flat, oblong protuberances, named *condyles.* They are covered with cartilage, and ſerve for the articulation of the head with the firſt vertebra of the neck.

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* The ancients, who ſuppoſed it to ſerve for the evacuation of ſuperfluous moiſture from the brain, named it *bregma*, or the fountain: hence the parietal bones are ſometimes called *oſſa bregmatis*; and hence the term *fontanelle*, which the French apply to this part.

In the inferior portion of this bone, at the baſis of the cranium, and immediately behind the cuneiform proceſs, we obſerve a conſiderable hole through which the medulla oblongata paſſes into the ſpine. The nervi acceſſorii, the vertebral arteries, and ſometimes the vertebral veins likewiſe, paſs through it. Man being deſigned for an erect poſture, we find this foramen magnum nearly in the middle of the baſis of the human cranium, and at a pretty equal diſtance from the poſterior part of the occiput, and the anterior part of the lower jaw: whereas in quadrupeds it is nearer the back part of the occiput*. Beſides this hole, we obſerve four other ſmaller foramina; viz. two before, and two behind the condyles. The former ſerve for the tranſmiſſion of the ninth pair of nerves, and the two latter for the veins which paſs from the external parts of the head to the lateral ſinuſes.

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* See a paper by M. Daubenton, "Sur la ſituation du trou occipital dans l'homme et dans les animaux."—Mem. de l'Acad. des Sciences 1764.

On looking over the internal ſurface of the os occipitis, we perceive the appearance of a croſs, formed by a very prominent ridge, which riſes upwards from near the foramen magnum, and by two tranſverſe ſinuoſities, one on each ſide of the ridge. This croſs occaſions the formation of four foſſæ, two above and two below the ſinuoſities. In the latter are placed the lobes of the cerebellum, and in the former the poſterior lobes of the brain.—The two ſinuoſities ſerve to receive the lateral ſinuſes.

In the upper part of this bone is ſeen a continuation of the ſinuoſity of the longitudinal ſinus; and at the baſis of the cranium we obſerve the inner ſurface of the cuneiform proceſs made concave for the reception of the medulla oblongata.

The occipital bone is thicker and ſtronger than any of the other bones of the head, if we except the petrous part of the oſſa temporum; but it is of unequal thickneſs.—At its lateral and inferior parts, where it is thinneſt, we find it covered by a great number of muſcles.

The reaſon for ſo much thickneſs and ſtrength in this bone ſeems to be, that it covers the cerebellum, in which the leaſt wound is of the utmoſt conſequence; and that it is, by its ſituation, more liable to be fractured by falls than any other bone of the cranium. For, if we fall forwards, the hands are naturally put out to prevent the forehead's touching the ground; and if on one ſide, the ſhoulders in a great meaſure protect the ſides of the head; but if a perſon falls backwards, the hind part of the head conſequently ſtrikes againſt the earth, and that too with conſiderable violence. Nature therefore has wiſely conſtructed this bone ſo as to be capable of the greateſt reſiſtance, by giving it the greateſt ſtrength at its upper part, where it is the moſt expoſed to injury.

The os occipitis is joined, by means of the cuneiform proceſs, to the ſphenoid bone, with which it often oſſifies, and makes but one bone in thoſe who are advanced in life. It is connected to the parietal bones by the lambdoidal ſuture, and to the temporal bones by the additamentum of the temporal ſuture. The head is likewiſe united to the trunk by means of this bone. The two condyles of the occipital bone are received into the ſuperior oblique proceſſes of the atlas, or firſt vertebra of the neck, and it is by means of this articulation that a certain degree of motion of the head, backwards and forwards, is performed. But it allows only very little motion to either ſide; and ſtill leſs of a circular motion, which the head obtains principally by the circumvolution of the atlas on the ſecond vertebra, as we ſhall deſcribe more particularly in treating of the vertebræ.

In the fœtus, the os occipitis is divided by an unoſſified cartilaginous ſubſtance into four parts. One of theſe, which is the largeſt, conſtitutes all that portion of the bone that is above the foramen magnum; two others, which are much ſmaller, compoſe the ſides of the foramen magnum, and include the condyloid proceſſes; and the fourth is the cuneiform proceſs. This laſt is ſometimes not completely united with the reſt, ſo as to form one bone, before the ſixth or ſeventh year.

Of the Temporal Bones.

THESE two bones, which are ſituated one on each ſide of the head, are of a very irregular figure. They are uſually divided into two parts, one of which, from the manner of its connexion with the neighbouring bones, is called *os ſquamoſum*, and the other *os petroſum*, from its irregularity and hardneſs.

In both theſe parts there are proceſſes and cavities to be deſcribed. Externally there are three proceſſes; one anterior, called the *zygomatic* proceſs, which is ſtretched forwards to join with the os malæ, and thus forms the bony jugum under which the temporal muſcle paſſes; one poſterior, called the *maſtoid* or *mamillary* proceſs, from its reſemblance to a nipple; and one inferior, called the *ſtyloid* proceſs, from its ſhape, which is ſaid to reſemble that of the ancient *ſtylus ſcriptorius* *. In young ſubjects this proceſs is united with the bone by an intermediate cartilage, which ſometimes, even in adults, is not completely oſſified. Three muſcles have their origin from this proceſs, and borrow half of their names from it, viz. ſtylo-gloſſus, ſtylo-hyoideus, and ſtylo-pharyngeus.—Round the root of this proceſs there is a particular riſing of the os petroſum, which ſome writers deſcribe as a proceſs, and, from its appearance with the ſtyloid, have named it *vaginalis*—others deſcribe the ſemi-circular ridge of the meatus auditorius externus as a fifth proceſs, to which they give the name of *auditory*.

The depreſſions and cavities are, 1. a large foſſa which ſerves for the articulation of the lower jaw; it is ſituated between the zygomatic, auditory, and vaginal proceſſes, and is ſeparated in its middle by a fiſſure into which the ligament that ſecures the articulation of the lower jaw with this bone is fixed. The fore part of this cavity, which receives the condyle of the jaw, is covered with cartilage; the back part only with the perioſteum. 2. A long foſſa behind the maſtoid proceſs, where the digaſtric muſcle has its origin. 3. The *meatus auditorius externus*, the name given to a large funnel-like canal that leads to the organ of hearing. 4. The *ſtylo-maſtoid hole*, ſo called from its ſituation between the ſtyloid and maſtoid proceſſes. It is likewiſe called the aqueduct of Fallopius, and affords a paſſage to the portio dura of the auditory or ſeventh pair of nerves. 5. Below and on the fore part of the laſt foramen we obſerve part of the jugular foſſa, a thimble-like cavity, in which the beginning of the internal jugular vein is lodged. 6. Before, and a little above this foſſa, is the orifice of a foramen, through which paſs the internal carotid artery, and two filaments of the intercoſtal nerve. This conduit runs firſt upward and then forward, forming a kind of elbow, and terminates at the end of the os petroſum. 7. At this part of the oſſa temporum we obſerve the orifice of a canal which runs outwards and backwards in an horizontal direction, till it terminates in the cavity of the ear called tympanum. This canal, which in the recent ſubject is continued from the ear to the mouth, is called the *Euſtachian tube.* —We ſhall ſpeak of it more particularly hereafter. 8. A ſmall hole behind the maſtoid proceſs, which ſerves for the tranſmiſſion of a vein to the lateral ſinus. But this, like other foramina in the ſcull that ſerve only for the tranſmiſſion of veſſels, is neither uniform in its ſituation, nor to be met with in every ſubject.

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* Monro on the Bones.

The internal ſurface of theſe bones may eaſily be divided into three parts. The firſt, uppermoſt and largeſt, is the ſquamous part, which is ſlightly concave from the impreſſion of the brain. Its ſemi circular edge is ſloping, ſo that the external lamella of the bone advances farther than the internal, and thus reſts more ſecurely on the parietal bones. The ſecond and middlemoſt, which is the petrous part of the bone, forms a hard, craggy protuberance, nearly of a triangular ſhape. On its poſterior ſide we obſerve a large foramen, which is the meatus auditorius internus; it receives the double nerve of the ſeventh pair, viz. the portio dura and portio mollis of that pair. About the middle of its anterior ſurface is a ſmall foramen, which opens into the aqueduct of Fallopius, and receives a twig of the portio dura of the ſeventh pair of nerves. This foramen having been firſt deſcribed by Fallopius*, and by him named *hiatus*, is ſometimes called *hiatus Fallopii* Beſides theſe, we obſerve other ſmaller holes for the tranſmiſſion of blood veſſels and nerves. Below this craggy protuberance is the third part, which, from its ſhape and connexion with the os occipitis by means of the lambdoidal ſuture, may be called the lambdoidal angle of the temporal bone. It is concave, from the impreſſion of the brain; it helps to form the poſterior and inferior foſſæ of the ſcull, and has a conſiderable furrow, in which is lodged part of the lateral ſinus.

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* Obſerv. Anatom.

THE temporal bones differ a little in their ſtructure from the other bones of the cranium. At their upper parts they are very thin, and almoſt without diploë, but below they have great ſtrength and thickneſs. In the fœtus, the thin upper part, and the lower craggy part, are ſeparated by a cartilaginous ſubſtance—there is no appearance either of the maſtoid or ſtyloid proceſſes, and, inſtead of a long funnel-like meatus auditorius externus, there is only a ſmooth bony ring, within which the membrana tympani is faſtened *.

WITHIN the petrous part of theſe bones there are ſeveral cavities, proceſſes, and bones, which, as they belong altogether to the ear, and do not enter into the formation of the cranium, will be deſcribed when we are treating of the organs of hearing.

THE oſſa temporum are connected by ſuture with the oſſa parietalia, the os occipitis,

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* Monro on the Bones, p. 101.

the oſſa malarum, and the os ſphenoides; and are articulated, as we have ſeen, with the lower jaw.

Of the Os Sphenoides.

THE os ſphenoides, or cuneiforme as it is called from its wedge-like ſituation amidſt the other bones of the head, is of a more irregular figure than any other bone. It has been compared to a bat with its wings extended. This reſemblance is but faint, but it would be difficult perhaps to find any thing it reſembles more.

We diſtinguiſh in this bone its body or middle part, and its wings or ſides, which are much more extenſive than its body.

Each of its wings or lateral proceſſes is divided into two parts. Of theſe, the uppermoſt and moſt conſiderable portion, helping to form the deepeſt part of the temporal foſſa on each ſide, is called the *temporal proceſs*. The other portion makes a part of the orbit, and is therefore named the *orbitar proceſs*. The back part of each wing, from its running out ſharp to meet the os petroſum, has been called the *ſpinous proceſs*; and the two proceſſes, which ſtand out almoſt perpendicular to the baſis of the ſcull, have been named *pterygoid* or *aliform* proceſſes, though they may be ſaid rather to reſemble the legs than the wings of the bat. Each of theſe proceſſes has two plates and a middle foſſa facing backwards; of theſe plates the external one is the broadeſt, and the internal one the longeſt. The lower end of the internal plate forms a kind of hook, over which paſſes the round tendon of the *muſculus circumflexus palati*. Beſides theſe, we obſerve a ſharp middle ridge, which ſtands out from the middle of the bone. The fore part of it, where it joins the naſal lamella of the ethmoidal bone, is thin and ſtreight; the lower part of it is thicker, and is received into the vomer.

The cavities obſervable on the external ſurface of the bone, are where it helps to form the temporal, naſal, and orbitar foſſæ.

It has likewiſe two foſſæ in its pterygoid proceſſes. Behind the edge, which ſeparates theſe two foſſæ, we obſerve a ſmall groove, made by a branch of the ſuperior maxillary nerve in its paſſage to the temporal muſcle. Beſides theſe, it has other depreſſions, which ſerve chiefly for the origin of muſcles.

Its foramina are four on each ſide. The three firſt ſerve for the paſſage of the optic, ſuperior maxillary, and inferior maxillary nerves; the fourth tranſmits the largeſt artery of the dura mater.—On each ſide we obſerve a conſiderable fiſſure, which, from its ſituation, may be called the ſuperior orbitar fiſſure. Through it paſs the third and fourth pair of nerves, a branch of the fifth, and likewiſe the ſixth pair. Laſtly, at the baſis of each pterygoid proceſs, we obſerve a foramen which is named *pterygoidean*, and ſometimes *Vidian*, from Vidius who firſt deſcribed it*. Through it paſſes a branch of the external carotid, to be diſtributed to the noſe.

The os ſphenoides on its internal ſurface affords three foſſæ.—Two of theſe are conſiderable ones; they are formed by the lateral proceſſes, and make part of the leſſer foſſæ of the baſis of the ſcull. The third, which is ſmaller, is on the top of the body of the bone, and is called *ſella Turcica*, from its reſemblance to a Turkiſh ſaddle.—In this foſſa the pituitary gland is placed. At each of its four angles is a proceſs. They are called the *clinoid* proceſſes, and are diſtinguiſhed by their ſituation into anterior and poſterior proceſſes. The two latter are frequently united into one.

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* De Anatom. lib. 2.

Within the ſubſtance of the os ſphenoides, immediately under the ſella Turcica, we find two cavities, ſeparated by a thin bony lamella. Theſe are the ſphenoidal ſinuſes. They are lined with the pituitary membrane, and, like the frontal ſinuſes, ſeparate a mucus which paſſes into the noſtrils. In ſome ſubjects there is only one cavity; in others, though more rarely, we find three.

In infants the os ſphenoides is compoſed of three pieces, one of which forms the body of the bone and its pterygoid proceſſes, and the other two its lateral proceſſes. The clinoid proceſſes may even then be perceived in a cartilaginous ſtate, though ſome writers have aſſerted the contrary; but we obſerve no appearance of any ſinus.

THIS bone is connected with all the bones of the cranium, and likewiſe with the oſſa maxillaria, oſſa malarum, oſſa palati, and vomer. Its uſes may be collected from the deſcription we have given of it.

Of the Os Ethmoides.

THE os ethmoides, or ſieve-like bone[*], as it is called, from the great number of ſmall holes with which it is pierced, is placed in the anterior part of the baſis of the ſcull, incloſed in ſome meaſure by the inferior and middle part of the os frontis, and is the laſt bone that enters into the compoſition of the cranium.—It is of a very irregular figure, not eaſily deſcribed.

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[*] Os cribiforme.

There are three parts to be deſcribed in this bone, viz. its middle part and its ſides. The middle part, from which the bone derives its name, is a thin horizontal lamella, or bony plate, pierced obliquely with a great number of ſmall holes, through which paſs as many filaments of the olfactory nerve.—From the middle of the inner ſide of this cribiform lamella riſes up a thick proceſs, which, from its ſuppoſed reſemblance to a cock's comb, has been named *criſta galli.* To the ridge of this proceſs, and the imperforated part of the cribiform lamella, the falx is attached, which divides the brain into two hemiſpheres.—On the outer ſurface of the cribiform lamella we obſerve a thin perpendicular plate, which has the ſame common baſis as the criſta galli, and divides the cavity of the noſtrils, though unequally, it being uſually inclined more to one ſide than the other.

The ſides of the os ethmoides may be divided into two portions contiguous to each other. The uppermoſt of theſe is compoſed of a great number of cells, which communicate with each other, and open into the cavity of the noſe. The outer ſurface of theſe cells conſiſts of a bony lamella, thin like the cells themſelves, but ſmooth and plain. This part of the bone, which forms a part of the orbit, was formerly conſidered as a ſeparate bone, and called *os planum*; a name which it ſtill retains. The other of the two portions, into which we divided the ſides of the bone, conſiſts of a thin bony lamella, placed below the cells on each ſide. Theſe two proceſſes, from their ſituation, ſubſtance, and figure, have ſometimes been called *oſſa ſpongioſa*, or *turbinata ſuperiora.*

In children the os ethmoides conſiſts of three pieces, its lateral portions being oſſified, while its middle part is in a cartilaginous ſtate. It is connected with the os frontis, os ſphenoides, oſſa maxillaria, oſſa unguis, oſſa naſi, and vomer. All its different cells are, in the recent ſubject, lined with the pituitary membrane; and, from its ſituation and ſtructure, we may perceive that it ſerves to enlarge the cavity of the noſe, in which the organ of ſmelling reſides; to aſſiſt in the formation of the cranium, and orbits; and to afford a paſſage to the olfactory nerves.

Of the Bones of the Face.

THE face is uſually divided into the upper and lower jaws.—Of theſe, the latter is capable of motion, but the former is immoveable. The bones of the upper jaw are thirteen in number, excluſive of the teeth, which we ſhall deſcribe ſeparately, after having finiſhed the other bones of the head. Of theſe thirteen bones, there are ſix on each ſide of the maxilla ſuperior, or upper jaw, and one in the middle.

The bones, which are in pairs, are the oſſa maxillaria, oſſa malarum, oſſa palati, oſſa unguis, oſſa naſi, and oſſa ſpongioſa inferiora—the ſingle bone is the vomer.

Of the Oſſa Maxillaria Superiora:

THESE bones, which conſtitute the moſt conſiderable portion of the upper jaw, are two in number, and generally remain diſtinct through life. Their figure is exceedingly irregular, and not eaſily to be deſcribed. On each of theſe bones we obſerve ſeveral eminences. One of theſe is at the upper and fore part of the bone, and, from its making part of the noſe, is called the *naſal* proceſs.—Internally, in the inferior portion of this proceſs, we obſerve a foſſa, which, with the os unguis, forms a paſſage for the lachrymal duct. Into this naſal proceſs likewiſe is inſerted the ſhort round tendon of the *muſculus orbicularis palpebrarum.*—Backwards and outwards, from the root of the naſal proceſs, the bone helps to form the lower ſide of the orbit, and this part is therefore called the *orbitar* proceſs. Behind this orbitar proceſs we obſerve the bone forming a conſiderable tuberoſity, and at the upper part of this tuberoſity is a channel, which is almoſt a complete hole. In this channel paſſes a branch of the fifth pair of nerves, which, together with a ſmall artery, is tranſmitted to the face through the external orbitar foramen, which opens immediately under the orbit.—Where the bone on each ſide is joined to the os malæ, and helps to form the cheeks, we obſerve what is called the *malar* proceſs.—The lower and anterior parts of the bone make a kind of circular ſweep, in which are the the *alveoli* or ſockets for the teeth—this is called the *alveolar* proceſs. This alveolar proceſs has poſteriorly a conſiderable tuberoſity on its internal ſurface. Above this alveolar proceſs, and juſt behind the fore teeth, we obſerve an irregular hole, called the *foramen inciſivum*, which ſeparating into two, and ſometimes more holes, ſerves to tranſmit ſmall arteries and veins, and a minute branch of the fifth pair of nerves, to the noſtrils.

There are two horizontal lamellæ behind the alveolar proceſs, which, uniting together, form part of the roof of the mouth, and divide it from the noſe. This partition being ſeated ſomewhat higher than the lower edge of the alveolar proceſs, gives the roof of the mouth a conſiderable hollowneſs.

Where the oſſa maxillaria are united to each other, they project ſomewhat forwards, leaving between them a furrow, which receives the inferior portion of the ſeptum naſi.

Each of theſe bones is hollow, and forms a conſiderable ſinus under its orbitar part. This ſinus, which is uſually, though improperly, called *antrum Highmorianum* *, is lined with the pituitary membrane. It anſwers the ſame purpoſes as the other ſinuſes of the noſe, and communicates with the noſtrils by an opening, which appears to be a large one in the ſkeleton, but which in the recent ſubject is much ſmaller.

In the fœtus, inſtead of theſe ſinuſes, we obſerve only an oblong depreſſion at each ſide of the noſtrils, nor is the tuberoſity of the alveolar proceſs then formed.—On the ſide of the palate in young ſubjects we may remark a kind of fiſſure, which ſeems to ſeparate the portion of the bone which contains the dentes inciſores from that which contains the dentes canini. This fiſſure is ſometimes apparent till the ſixth year, but after that period it in general wholly diſappears.

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* Highmore, in his *Corporis Humani Diſquiſ. Anat.* has given an accurate deſcription of theſe ſinuſes; and therefore many anatomiſts have named them after him: but they were known long before his time, and are deſcribed by Fallopius in his *Obſerv. Anatom.*

The oſſa maxillaria not only ſerve to form the cheeks, but likewiſe the palate, noſe, and orbits; and, beſides their union with each other, they are connected with the greateſt part of the bones of the face and cranium, viz. with the oſſa naſi, oſſa malarum, oſſa unguis, oſſa palati, os frontis, os ſphenoides, and os ethmoides.

Of the Oſſa Malarum.

THE oſſa malarum are the prominent ſquare bones which form the upper part of the cheeks. They are ſituated cloſe under the eyes, and make part of the orbits. Each of theſe bones has three ſurfaces to be conſidered. One of theſe is exterior and ſomewhat convex. The ſecond is ſuperior and concave, ſerving to form the lower and lateral parts of the orbit. The third, which is poſterior, is very unequal, and concave, for the lodgment of the lower part of the temporal muſcle.

Each of theſe bones may be deſcribed as having four proceſſes, formed by their four angles. Two of theſe may be called *orbitar* proceſſes. The ſuperior one is connected with the orbitar proceſs of the os frontis; and the inferior one with the malar proceſs of the maxillary bone. The third is connected with the temporal proceſs of the ſphenoid bone; and the fourth forms a bony arch, by its connection with the zygomatic proceſs of the temporal bone.

In infants theſe bones are entire and completely oſſified.

Of the Oſſa Naſi.

THE oſſa naſi, which are ſo called from their conſtituting the upper part of the noſe, reſemble two irregular ſquares. They are narrower and thicker above than below. Externally they are ſomewhat convex, and internally a little concave. This ſhape is calculated to reſiſt external violence, and to enlarge the cavity of the noſe.—On the external ſurface of theſe bones we commonly obſerve a ſmall hole, which ſerves for the tranſmiſſion of an artery to the pituitary membrane. At their fore part they are united to each other; above, to the os frontis; laterally, to the oſſa maxillaria ſuperiora; poſteriorly and interiorly, to the ſeptum narium; and below, to the cartilages of the noſe.—Theſe bones are complete in the fœtus.

Of the Oſſa Unguis.

THESE bones derive their name from their figure, which reſembles that of a finger nail. They are likewiſe ſtyled *oſſa lachrymalia*, becauſe they help to form, with the naſal proceſs of the os maxillare ſuperius on each ſide, an excavation for the lodgment of the lachrymal ſac, and to compoſe part of the foſſa for the lachrymal duct, through which the tears paſs into the noſtrils.

THESE bones, which are the ſmalleſt of the face, are of an irregular ſhape, and may be deſcribed as having two ſmooth parts, divided by a middle ridge on their external ſurface. One of theſe parts, which is flat, forms a ſmall part of the orbit. The other, which is next to the noſe, is concave, and ſerves for the lodgment of the lachrymal ſac, and part of the lachrymal duct, as we have before obſerved.—The oſſa unguis are fully formed in the fœtus. Each of theſe bones is joined to the os maxillare ſuperius, os frontis, and os ethmoides.

Of the Oſſa Palati.

THESE bones are of a very irregular figure. They are placed between the oſſa maxillaria ſuperiora and the os ſphenoides, at the back part of the roof of the mouth, and extend from thence to the bottom of the orbit.—Each of theſe bones may be divided into four parts; viz. the inferior or ſquare portion, the pterygoid proceſs, the naſal lamella, and orbitar proceſs.—The firſt of theſe, or the ſquare part of the bone, helps to form the palate of the mouth. The upper part of its internal edge riſes into a ſpine, which makes part of the ſeptum narium.—The *pterygoid* proceſs, which is ſmaller above than below, is ſo named from its being united with the pterygoid proceſſes of the ſphenoid bone, with which it helps to form the pterygoid foſſæ. It is ſeparated from the ſquare part of the bone, and from the naſal lamella, by an oblique foſſa, which, applied to ſuch another in the os maxillare, forms a paſſage for a branch of the fifth pair of nerves.—The *naſal* lamella is nothing more than a very thin bony plate, which ariſes from the upper ſide of the external edge of the ſquare part of the bone. Its inner ſurface is concave, and furniſhed with a ridge which ſupports the back part of the os ſpongioſum inferius. Externally, it is convex, and firmly united with the maxillary bone.—The *orbitar* proceſs is more irregular than any other part of the bone. It has a ſmooth ſurface where it helps to form the orbit; and, when viewed in its place, we ſee it contiguous to that part of the orbit which is formed by the os maxillare, and appearing as a ſmall triangle at the inner extremity of the orbitar proceſs of this laſt mentioned bone.—This fourth part of the os palati likewiſe helps to form the zygomatic foſſa on each ſide, and there its ſurface is concave.—Between this orbitar proceſs and the ſphenoid bone, a hole is formed, through which an artery, vein, and nerve, are tranſmitted to the noſtrils.—The oſſa palati are complete in the fœtus.—They are joined to the oſſa maxillaria ſuperiora, os ſphenoides, os ethmoides, oſſa ſpongioſa inferiora, and vomer.

Of the Vomer.

THIS bone, which derives its name from its ſuppoſed reſemblance to a ploughſhare, forms the lower and back parts of the ſeptum narium. Santorini [*], and ſome other writers* ſince him, have, without ſufficient reaſon, conſidered it as a part of the ethmoid bone.—It is a flat bone, forming an irregular ſquare, and is thicker at its edges than its middle, where it is ſo extremely thin, that in the adult it can ſeldom be ſeparated entire.—Its upper edge is firmly united to the naſal lamella of the os ethmoides, and to the baſis of the os ſphenoides; its lower edge is as cloſely connected with the naſal ſpines of the maxillary and palate bones.—At its upper part we obſerve a furrow extending through its whole length. The back part of this furrow, which is the largeſt, receives a proceſs of the ſphenoid bone. From this the furrow advances forwards, and, becoming narrower and ſhallower, receives ſome part of the naſal lamella ethmoidea.—The reſt ſerves to ſupport the middle cartilage of the noſe.

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[*] Obſervationes Anatom.

In forming the ſeptum narium, this bone, as well as the naſal lamella of the os ethmoides, is uſually inclined more to one ſide than the other.—Its connections, as we have ſeen, are with the os ſphenoides, os ethmoides, oſſa maxillaria ſuperiora, and oſſa palati.—In young ſubjects the vomer is compoſed of two diſtinct plates.

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* Lieutaud, *Eſſais Anat.*—Petit, *Anat. Chir. de* Palfyn.

Of the Oſſa Spongioſa Inferiora.

THESE bones, which, from their ſhape, are ſometimes called *oſſa turbinata*, have, by ſome anatomiſts, been deſcribed as belonging to the ethmoid bone; and, by others, as portions of the oſſa palati. In young ſubjects, however, they are evidently diſtinct bones. They conſiſt of a ſpongy lamella in each noſtril. The convex ſurface of this lamella is turned towards the ſeptum narium, and its concave part towards the maxillary bone, covering the opening of the lachrymal duct into the noſe.—From their upper edge ariſe two proceſſes: the poſterior of theſe, which is the broadeſt, hangs as it were upon the edge of the antrum Highmorianum; the anterior one joins the os unguis, and forms a part of the lachrymal duct.

These bones are complete in the fœtus. They are lined with the pituitary membrane; and, beſides their connection with the ethmoid bone, are joined to the oſſa maxillaria ſuperiora, oſſa palati, and oſſa unguis.—Beſides theſe oſſa ſpongioſa inferiora, there are ſometimes two others, ſituated lower down, one in each noſtril. Theſe are very properly conſidered as a production of the ſides of the maxillary ſinus turned downwards*. In many ſubjects likewiſe we find other ſmaller bones, ſtanding out into the noſtrils, which, from their ſhape, might alſo deſerve the name of *turbinata*, but they are uncertain in their ſize, ſituation, and number.

Of the Os Maxillare Inferius.

THE maxilla inferior, or lower jaw, which, in its figure, may be compared to a horſe-ſhoe, is at firſt compoſed of two diſtinct bones; but theſe, ſoon after birth, unite together at the middle of the chin, ſo as to form only one bone. The ſuperior edge of this bone has, like the maxilla ſuperior, a proceſs, called the *alveolar* proceſs. This, as well as that of the upper jaw, to which it is in other reſpects a good deal ſimilar, is likewiſe furniſhed with cavities for the reception of the teeth.

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* Monro on the Bones.

The poſterior part of the bone, on each ſide, riſes perpendicularly into two proceſſes, one of which is called the *coronoid*, and the other the *condyloid* proceſs. The firſt of theſe is the higheſt: it is thin and pointed; and the temporal muſcle, which is attached to it, ſerves to elevate the jaw. The condyloid proceſs is narrower, thicker, and ſhorter than the other, terminating in an oblong, rounded head, which is formed for a moveable articulation with the cranium, and is received into the fore part of the foſſa we deſcribed in ſpeaking of the temporal bone —In this joint there is a moveable cartilage, which being more cloſely connected to the condyle than to the cavity, may be conſidered as belonging to the former.—This moveable cartilage is connected with both the articulating ſurface of the temporal bone and the condyle of the jaw, by diſtinct ligaments ariſing from its edges all round. Theſe attachments of the cartilage are ſtrengthened, and the whole articulation ſecured, by an external ligament; which is common to both, and which is fixed to the temporal bone, and to the neck of the condyle. On the inner ſurface of the ligament, which attaches the cartilage to the temporal bone, and backwards in the cavity, is placed what is commonly called the gland of the joint; at leaſt the ligament is there found to be much more vaſcular than at any other part*.

At the bottom of each coronoid proceſs, on its inner part, is a foramen or canal, which extends under the roots of all the teeth, and terminates at the outer ſurface of the bone near the chin. Each of theſe foramina affords a paſſage to an artery, vein, and nerve, which ſend off branches to the ſeveral teeth.

This bone is capable of a great many motions. The condyles, by ſliding from the cavity towards the eminences on each ſide, bring the jaw horizontally forwards, as in the action of biting; or the condyles only may be brought forwards, while the reſt of the jaw is tilted backwards, as is the caſe when the mouth is open. The condyles may alſo ſlide alternately backwards and forwards from the cavity to the eminence, and *vice verſa*; ſo that while one condyle advances, the other moves backwards, turning the body of the jaw from ſide to ſide, as in grinding the teeth. The great uſe of the cartilages ſeems to be that of ſecuring the articulation, by adapting themſelves to the different inequalities in theſe ſeveral motions of the jaw, and to prevent any injuries from friction. This laſt circumſtance is of great importance where there is ſo much motion, and accordingly this cartilage is found * in the different tribes of carnivorous animals, where there is no eminence and cavity, nor other apparatus for grinding.

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* Hunter on the Teeth.

THE alveolar proceſſes are formed of an external and internal plate, united together by thin bony partitions, which divide the proceſſes at the fore part of the jaw into as many ſockets as there are teeth. But, at the poſterior part, where the teeth have more than one root, each root has a diſtinct cell. Theſe proceſſes in both jaws, begin to be formed with the teeth, accompany them in their growth, and diſappear when the teeth fall. So that the loſs of the one ſeems conſtantly to be attended with the loſs of the other.

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* Hunter on the Teeth.

Of the Teeth.

IN early infancy nature deſigns us for the ſofteſt aliment, ſo that the gums alone are then ſufficient for the purpoſe of manducation; but as we advance in life, and require a different food, ſhe wiſely provides us with teeth. Theſe are the hardeſt and whiteſt of our bones, and, at full maturity, we uſually find thirty-two in both jaws; viz. ſixteen above, and as many below. Their number varies indeed in different ſubjects; but I have never ſeen it exceed thirty-two, and it will very rarely be found to be leſs than twenty-eight.

Each tooth may be divided into two parts; viz. its body, or that part which appears above the gums; and its fangs or root, which is fixed into the ſocket. The boundary between theſe two, cloſe to the edge of the gum, where there is uſually a ſmall circular depreſſion, is called the neck of the tooth.—The teeth of each jaw are commonly divided into three claſſes; but before we ſpeak of each of theſe in particular, it will be right to ſay ſomething of their general ſtructure.

We may begin therefore with obſerving, that every tooth is compoſed of its cortex or enamel, and its internal bony ſubſtance. The enamel, or, as it is ſometimes called, the vitreous part of the tooth, is a very hard and compact ſubſtance, of a white colour, and peculiar to the teeth. It is found only upon the body of the tooth, covering the outſide of the bony or internal ſubſtance. When broken it appears fibrous or ſtriated; and all the ſtriæ are directed from the circumference[*] to the center of the tooth.

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[*] Hunter on the Teeth,

This enamel is thickeſt on the grinding ſurface, and on the cutting edges or points of the teeth, becoming gradually thinner as it approaches the neck, where it terminates inſenſibly. It would ſeem to be an earth, united with a portion of animal ſubſtance, as it is not reducible to quick lime by fire, till it has firſt been diſolved in an acid *. But, as yet, we are by no means able to aſcertain its real nature. Some writers have deſcribed it as being vaſcular, but it is certain that no injection will ever reach this ſubſtance; that it receives no tinge from madder; and that it affords no appearance of a circulation of fluids.

The bony part of a tooth reſembles other bones in its ſtructure, but is much harder than the moſt compact part of bones in general. It compoſes the inner part of the body and neck, and the whole of the root of the tooth.

This part of a tooth, when completely formed, does not, like the other bones, re-

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* Nat. Hiſt. of the Human Teeth.

ceive a tinge from madder, nor do the minuteſt injections penetrate into its ſubſtance, although many writers have aſſerted the contrary. Mr. Hunter has been therefore induced * to deny its being vaſcular, although he is aware that the teeth, like other bones, are liable to ſwellings, and that they are found anchyloſed with their ſockets. He ſuppoſes, however, that both theſe may be original formations; and, as the moſt convincing proof of their not being vaſcular, he reaſons from the analogy between them and other bones. He obſerves, for inſtance, that in a young animal that has been fed with madder, the parts of the teeth which were formed before it was put on the madder diet will appear of their natural colour, but that ſuch parts as were formed while the animal was taking the madder, will be of a red colour; whereas, in other bones, the hardeſt parts are ſuſceptible of the dye, though more ſlowly than the parts which are growing Again, he tells us, that if you leave off feeding the animal with madder a conſiderable time before you kill it,

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* Natural Hiſtory of the Teeth.

you will find the above appearances ſtill ſubſiſting, with this addition, that all the parts of the teeth which were formed after leaving off the madder will be white. This experiment proves that a tooth once tinged does not loſe its colour; whereas other bones do (though very ſlowly) return again to their natural appearance: and, as the dye in this caſe muſt be taken into the habit by abſorbents, he is led to ſuſpect that the teeth are without abſorbents as well as other veſſels.

These arguments are very ingenious, but to me they are far from being ſatisfactory. I even think the facts adduced by Mr. Hunter capable of a different explanation from that which he has given them; and when to theſe I add certain other facts relative to the ſame ſubject, I own that I do not heſitate to believe that this bony part of a tooth has a circulation through its ſubſtance, and even lymphatics, although, from the hardneſs of its ſtructure, we are unable to demonſtrate its veſſels. My reaſons for differing from Mr. Hunter on this occaſion are as follows; 1ſt. We find that a tooth recently drawn, and tranſplanted into another ſocket, becomes as firmly fixed after a certain time, and preſerves the ſame colour as the reſt of the ſet; whereas a tooth that has been long drawn before it is tranſplanted, will never become fixed. Mr. Hunter indeed is aware of this objection, and refers the ſucceſs of the tranſplantation, in the firſt inſtance, to the living principle poſſeſſed by the tooth, and which he thinks may exiſt independent of a circulation. But however applicable ſuch a doctrine may be to zoophytes, I ſuſpect that it will not hold good in man, and others of the more perfect animals; and I have no doubt but that, in the caſe of a tranſplanted tooth, there is a real union by veſſels. 2dly. The ſwellings of the fangs of a tooth, which in many inſtances are known to be the effects of diſeaſe, and which are analogous to the ſwellings of other bones, are a clear proof of a ſimilarity of ſtructure, eſpecially as we find them inveſted with a perioſteum. 3dly. It is a curious fact, though as yet perhaps not generally known, that, in caſes of phthiſis pulmonalis, the teeth become of a milky whiteneſs, and, in ſome degree, tranſparent; and this, I think, ſufficiently proves them to have abſorbents.

Each tooth has an inner cavity, which, beginning by a ſmall opening at the point of the fang, becomes larger, and terminates in the body of the tooth.

This cavity is ſupplied with blood-veſſels and nerves, which paſs through the ſmall hole in the root. In old people this hole ſometimes cloſes, and the tooth becomes then inſenſible.

The teeth are inveſted with a perioſteum, from their fangs to a little beyond their bony ſockets, where it is attached to the gums. This membrane ſeems to be common to the tooth which it incloſes, and to the ſockets which it lines.

The teeth are likewiſe ſecured in their ſockets by a red ſubſtance, called the *gums*, which every where covers the alveolar proceſſes, and has as many perforations as there are teeth. The gums are exceedingly vaſcular, and have ſomething like a cartilaginous hardneſs and elaſticity, but do not ſeem to have much ſenſibility. The gums of infants, which perform the offices of teeth, have a hard ridge extending through their whole length; but in old people, who have loſt their teeth, this ridge is wanting.

The three claſſes into which the teeth are commonly divided, are *inciſores*, *canini*, and *molares* or *grinders*. The inciſores are the four teeth in the fore part of the jaws; they derive their name from their uſe in dividing and cutting the food in the manner of a wedge, and have each of them two ſurfaces, which meet in a ſharp edge. Of theſe ſurfaces, the anterior one is convex, and the poſterior one ſomewhat concave. In the upper jaw they are uſually broader and thicker, eſpecially the two firſt, than thoſe of the under jaw, over which they generally fall by being placed a little obliquely.

The canini* are the longeſt of all the teeth, deriving their name from their reſemblance to a dog's tuſks. There is one of theſe teeth on each ſide of the inciſores, ſo that there are two in each jaw. They are the longeſt of all the teeth. Their fangs differ from that of the inciſores only in being much larger, and their ſhape may be eaſily deſcribed to be that of an inciſor with its edge worn off, ſo as to end in a narrow point inſtead of a thin edge.

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* Mr. Hunter gives them the name of cuſpidati.

The canini not being calculated for dividing like the inciſores, or for grinding, ſeem to be intended for laying hold of ſubſtances. Mr. Hunter remarks of theſe teeth *, that we may trace in them a ſimilarity in ſhape, ſituation, and uſe, from the moſt imperfect carnivorous animal, which we believe to be the human ſpecies, to the lion, which is the moſt perfectly carnivorous.

The grinders, or molares, of which there are ten in each jaw, are ſo called, becauſe from their ſize and figure they are calculated for grinding the food. The canini and inciſores have only one fang, but the three laſt

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* Nat. Hiſt. of the Human Teeth.

grinders in the under jaw have conſtantly two fangs, and the ſame teeth in the upper jaw three fangs. Sometimes theſe fangs are divided into two points near their baſe, and each of theſe points has, perhaps, been ſometimes conſidered as a diſtinct fang. The grinders likewiſe differ from each other in their appearance. The two firſt on each ſide, which Mr. Hunter appears to have diſtinguiſhed very properly by the name of *bicuſpides* *, ſeem to be of a middle nature between the inciſores and grinders; they have in general only one root, and the body of the tooth terminates in two points, of which the anterior one is the higheſt, ſo that the tooth has in ſome meaſure the appearance of one of the canini. The two grinders beyond theſe, on each ſide, are much larger. Their body forms almoſt a ſquare with rounded angles; and their grinding ſurface has commonly five points or protuberances, two of which are on the inner, and three on the outer part of the tooth.

The laſt grinder is ſhorter and ſmaller than the reſt, and; from its coming through the gums later than the reſt, and ſometimes not appearing till late in life, is called *dens ſapientiæ*. The variation in the number of teeth uſually depends on theſe dentes ſapientiæ.

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* Nat. Hiſt. of the Human Teeth.

Having thus deſcribed the appearance of the teeth in the adult, let us next conſider the manner of their formation and growth in the fœtus. We ſhall find that the alveolar proceſs, which begins to be formed at a very early period, appears, about the fourth month, only as a ſhallow longitudinal groove, divided by ſlight ridges into a number of intermediate depreſſions, which are to be the future alveoli or ſockets. Theſe depreſſions are at firſt filled with ſmall pulpy ſubſtances, included in a vaſcular membrane; and theſe pulpy ſubſtances are the rudiments of the teeth. As theſe advance in their growth, the alveolar proceſſes become gradually more completely formed. The ſurface of the pulp firſt begins to harden; the oſſification proceeding from one or more points, according to the kind of tooth that is to be formed. Thus, in the inciſores and canini, it begins from one point; in the biculſpides, from two points, correſponding with the future ſhape of thoſe teeth; and in the molares, from four or five points.— As the oſſification advances, the whole of the pulp is gradually covered with bone, excepting its under ſurface, and then the fang begins to be formed. Soon after the formation of this bony part, the tooth begins to be incruſted with its enamel; but in what manner this is depoſited we are as yet unable to explain. Perhaps the vaſcular membrane, which incloſes the pulp, may ſerve to ſecrete it. It gradually cryſtallizes upon the ſurface of the bony part, and continues to increaſe in thickneſs, eſpecially at the points and baſis of the tooth, till ſome time before the tooth begins to paſs through the gum; and when this happens, the enamel ſeems to be as hard as it is afterwards *, ſo that the air does not appear to have the leaſt effect in hardening it, as has been ſometimes ſuppoſed.

While the enamel is thus forming, the lower part of the pulp is gradually length-

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* Hunter on the Teeth.

ened out and oſſified, ſo as to form the fang. In thoſe teeth which are to have more than one fang, the oſſification begins from different parts of the pulp at one and the ſame time.—In this manner are formed the inciſores, the canini, and two molares on each ſide, making, in the whole, twenty teeth, in both jaws, which are ſufficient for the purpoſes of manducation in early life. As the fangs of the teeth are formed, their upper part is gradually puſhed-upwards, till at length, about the ſeventh, eighth, or ninth month * after birth, the inciſores, which are the firſt formed, begin to paſs through the gum. The firſt that appears is generally in the lower jaw. The canini and molares not being formed ſo ſoon as the inciſores, do not appear till about the twentieth or twenty-fourth month. Sometimes one of the canini, but more frequently one of the molares, appears firſt.

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* There are ſome few inſtances upon record, of children who have come into the world with ſeveral teeth. Pliny relates, that M. Curius was ſurnamed *Dentatus* from this circumſtance. Rzacinſki, in his Nat. Hiſt. of Poland, ſpeaks of a boy who was born with molares. Baron Haller, in his Phyſiology, has taken the pains to quote ſome other caſes of the ſame kind.

The danger to which children are expoſed, during the time of dentition, ariſes from the preſſure of the teeth in the gum, ſo as to irritate it, and excite pain and inflammation. The effect of this irritation is, that the gum waſtes, and becomes gradually thinner at this part, till at length the tooth protrudes. In ſuch caſes therefore we may, with great propriety, aſſiſt nature by cutting the gum.

These twenty teeth are called the *temporary*, or *milk* teeth, becauſe they are all ſhed between the age of ſeven and fourteen, and are ſupplied by others of a firmer texture, with larger fangs, which remain till they become affected by diſeaſe, or fall out in old age, and are therefore called the *permanent*, or *adult* teeth. The rudiments of theſe adult teeth begin to be formed at different periods. The pulp of the firſt adult inciſor, and of the firſt adult grinder, may be perceived in a fœtus of ſeven or eight months, and the oſſification begins in them about ſix months after birth. Soon after birth the ſecond inciſor, and the canine tooth on each ſide, begin to be formed. About the fifth or ſixth year the firſt bicuſpis, and about the ſeventh the ſecond bicuſpis, begin to oſſify. Theſe bicuſpides are deſtined to replace the temporary grinders. All theſe permanent teeth are formed in a diſtinct ſet of alveoli; ſo that it is not by the growing of one tooth under another, in the ſame ſocket, that the uppermoſt tooth is gradually puſhed out, as is commonly imagined; but the temporary teeth, and thoſe which are to ſucceed them, being placed in ſeparate alveoli, the upper ſockets gradually diſappear, as the under ones increaſe in ſize, till at length the teeth they contain, having no longer any ſupport, conſequently fall out.

But, beſides theſe twenty teeth which ſucceed the temporary ones, there are twelve others to be added, to make up the number thirty-two. Theſe twelve are three grinders on each ſide in both jaws; and, in order to make room for this addition, we find the jaws grow as the teeth grow, ſo that they appear as completely filled with twenty teeth, as they are afterwards with thirty-two. Hence, in children the face is flatter and rounder than in adults.

The firſt adult grinder uſually paſſes through the gum about the twelfth year; the ſecond, which begins to be formed in the ſixth or ſeventh year, cuts the gum about the ſeventeenth or eighteenth; and the third, or dens ſapientiæ, which begins to be formed about the twelfth year, paſſes through the gum between the age of twenty and thirty. The dentes ſapientiæ have, in ſome inſtances, been cut at the age of forty, fifty, ſixty, and even eighty years; and it ſometimes happens that they do not appear at all.

Sometimes likewiſe it happens, that a third ſet of teeth appear about the age of ſixty or ſeventy. I have never ſeen any inſtance of this kind myſelf, but there is no doubt that ſuch caſes do now and then occur. Diemerbroeck * tells us, that he himſelf, at the age of fifty-ſix, had a freſh canine tooth in the place of one he had loſt ſeveral years

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* Anat. Corp. Human.

before; M. du Fay * ſaw two inciſores and two canini cut the gum in a man aged eighty-four; Mr. Hunter † has ſeen two fore-teeth ſhoot up in the lower jaw of a very old perſon; and an account was lately publiſhed, of a man who had a complete ſet at the age of ſixty ‡. Other inſtances of the ſame kind are to be met with in authors. The circumſtance is curious, and, from the time of life at which it takes place, and the return of the catamenia, which ſometimes happens in women at the ſame age, it has been very ingeniouſly ſuppoſed ||, that there is ſome effort in nature to renew the body at that period.

The teeth are ſubject to a variety of accidents. Sometimes the gums become ſo affected as to occaſion them to fall out, and the teeth themſelves are frequently rendered carious by cauſes which have not hitherto been ſatisfactorily explained. The diſeaſe uſually begins on that ſide of the tooth

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* Mem. de l'Acad. des Sciences, 1730.

† Nat. Hiſt. of the Teeth.

‡ Med. Comm. of Edin. vol. iii.

|| Hunter's Nat. Hiſt. of the Teeth.

which is not expoſed to preſſure, and gradually advances, till an opening is made into the cavity: as ſoon as the cavity is expoſed, the tooth becomes liable to conſiderable pain, from the air coming into contact with the nerve.

Besides theſe accidental means by which the teeth are occaſionally affected, old age ſeldom fails to bring with it ſure and natural cauſes for their removal. The alveoli fill up, and the teeth conſequently fall out. The gums then no longer meet in the fore part of the mouth, the chin projects forwards, and the face being rendered much ſhorter, the whole phyſiognomy appears conſiderably altered.

Having thus deſcribed the formation, ſtructure, growth, and decay of the teeth, it remains for us to ſpeak of their uſes; the chief of which we know to be in maſtication. And here we cannot help obſerving the great variety in the ſtructure of the human teeth, which fits us for ſuch a variety of food, and which, when compared with the teeth given to other animals, may, in ſome meaſure, enable us to explain the nature of the aliment for which man is intended by nature. Thus, in ruminant animals we find inciſores only in the lower jaw, for cutting the graſs, and molares for grinding it; in graminivorous animals, we ſee molares alone; and in carnivorous animals, canine teeth, for catching at their prey, and inciſores and molares, for cutting and dividing it. But, as man is not deſigned to catch and kill his prey with his teeth, we obſerve that our canini are ſhaped differently from the fangs of beaſts of prey, in whom we find them either longer than the reſt of the teeth, or curved. The inciſores likewiſe are ſharper in thoſe animals than in man. Nor are the molares in the human ſubject ſimilar to the molares of carnivorous animals; they are flatter in man than in theſe animals; and, in the latter, we likewiſe find them ſharper at the edges, more calculated to cut and tear the food, and, by their greater ſtrength, capable of breaking the bones of animals. From theſe circumſtances, therefore, we may conſider man as partaking of the nature of theſe different claſſes; as approaching more to the carnivorous than to the herbivorous tribe of animals; but, upon the whole, formed for a mixed aliment, and fitted equally to live upon fleſh and upon vegetables. Thoſe philoſophers, therefore, who would confine man wholly to a vegetable food, do not ſeem to have ſtudied nature. As the molares are the laſt teeth that are formed, ſo they are uſually the firſt that fall out; this would ſeem to prove, that we require the ſame kind of aliment in old age as in infancy.

BESIDES the uſe of the teeth in maſtication, they likewiſe ſerve a ſecondary purpoſe, by aſſiſting in the articulation of the voice.

Of the Os Hyoides.

THIS bone, which is ſituated between the root of the tongue and the larynx, derives its name from its ſuppoſed reſemblance to the Greek letter υ, and is by ſome writers deſcribed along with the parts contained in the mouth. It is indeed ſeldom preſerved with the ſkeleton*, but as we find it, in many ſubjects, attached to the ſtyloid proceſs of the temporal bone, on each ſide, by means of a ligament, we may, perhaps, with the generality of authors, place it with more propriety after the bones of the face. Ruyſch † has ſeen theſe ligaments ſo completely oſſified, that the os hyoides was joined to the temporal bones by anchyloſis.

In deſcribing this bone, we may diſtinguiſh in it, its body, horns, and appendices.

The body is the middle and broadeſt part of the bone, ſo placed, that it may be eaſily felt with the finger in the fore part of the throat. Its fore part, which is placed towards the tongue, is irregularly convex, and its inner ſurface, which is turned towards the larynx, is unequally concave. The *cornua*, or horns, which are flat and a little bent, are conſiderably longer than the body of the bone, and may be ſaid to form the ſides of the *v*. Theſe horns are thickeſt near the body of the bone. At the extremity of each we obſerve a round tubercle, from which a ligament paſſes to the thyroid cartilage. The appendices, or leſſer horns, *(cornua minora,)* as they are called by ſome writers, are two ſmall proceſſes, which, in their ſize and ſhape, are ſomewhat like a grain of wheat. They riſe up, from the articulations of the cornua with the body of the bone, and are ſometimes connected with the ſtyloid proceſs, on each ſide, by means of a ligament. It is not unuſual to find ſmall portions of bone in theſe ligaments; and Ruyſch, as we have already obſerved, has ſeen them completely oſſified.

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* Mr. Cheſelden, in his *Oſteographia*, has wholly omitted this bone.

† Adverſ. Anat. dec. 3.

In the fœtus almoſt the whole of the bone is in a cartilaginous ſtate; excepting a ſmall point of bone in the middle of its body, and in each of its horns. The appendices do not begin to appear till after birth, and uſually remain cartilaginous many years.

The os hyoides ſerves to ſupport the tongue, and affords attachment to a variety of muſcles, ſome of which perform the motions of the tongue, while others act on the larynx and fauces.

CHAP. III.

Of the Bones of the Trunk.

THE trunk of the ſkeleton is compoſed of the ſpine, the pelvis, and the thorax.

SECTION I.

Of the Spine.

THE ſpine is a long bony column, which extends from the head to the lower part of the trunk, and is the great ſupport of the whole body.

IT is made up of a great number of bones, called vertebræ.

IT may be conſidered as being compoſed of two irregular pyramids, which are united to each other in that part of the loins where the laſt of the lumbar vertebræ is united to the os ſacrum.

The vertebræ, which form the upper and longeſt pyramid, are called true vertebræ; and thoſe which compoſe the lower pyramid, or the os ſacrum and the coccyx, are termed falſe vertebræ, becauſe they do not in every thing reſemble the others; and particularly becauſe, in the adult ſtate, they become perfectly immoveable, whilſt the upper ones continue to be capable of motion.—For it is upon the bones of the ſpine that the body turns, and their name has its derivation from the Latin verb *vertere*, which ſignifies *to turn*.

The true vertebræ, from their ſituation with reſpect to the neck, back, and loins, are divided into three claſſes, of *cervical*, *dorſal*, and *lumbar* vertebræ. We will firſt conſider the general ſtructure of all theſe, and then ſeparately deſcribe their different claſſes.

In each of the vertebræ, as in other bones, we may remark the body of the bone, its proceſſes and cavities.—The body may be compared to part of a cylinder cut off tranſverſely;

verſely: convex before, and concave behind, where it makes part of the cavity of the ſpine.

Each vertebra has commonly ſeven proceſſes. The firſt of theſe is the *ſpinous* proceſs, which is placed at the back part of the vertebra, and gives the name of ſpine to the whole of this bony canal. Two others are called *tranſverſe* proceſſes, from their ſituation with reſpect to the ſpine, and are placed on each ſide of the ſpinous proceſs. The four others, which are called *oblique* proceſſes, are much ſmaller than the other three. There are two of theſe on the upper, and two on the lower part of each vertebra, riſing from near the baſis of the tranſverſe proceſſes. They are ſometimes called *articular* proceſſes, becauſe they are articulated with each other; that is, the two ſuperior proceſſes of one vertebra are articulated with the two inferior proceſſes of the vertebra above it: and they are called oblique proceſſes, from their ſituation with reſpect to the proceſſes with which they are articulated. Theſe oblique proceſſes are articulated to each other by a ſpecies of ginglimus, and each proceſs is covered at its articulation with cartilage.

There is in every vertebra, between its body and apophyſes, a foramen, large enough to admit a finger. Theſe foramina correſpond with each other through all the vertebræ, and form a long bony conduit, for the lodgment of the ſpinal marrow.

Besides this great hole, there are four notches on each ſide of every vertebra, between the oblique proceſſes and the body of the vertebra. Two of theſe notches are at the upper, and two at the lower part of the bone. Each of the inferior notches, meeting with one of the ſuperior notches of the vertebra below it, forms a foramen; whilſt the ſuperior notches do the ſame with the inferior notches of the vertebra above it. Theſe four foramina form paſſages for blood-veſſels, and for the nerves that paſs out of the ſpine.

The vertebræ are united together by means of a ſubſtance, compreſſible like cork, which forms a kind of partition between the ſeveral vertebræ. This intervertebral ſubſtance ſeems, in the fœtus, to approach nearly to the nature of ligaments; in the adult, it has a greater reſemblance to cartilage. When cut horizontally, it appears to conſiſt of concentrical curved fibres*; externally, it is firmeſt and hardeſt; internally, it becomes thinner and ſofter, till at length, in the center, we find it in the form of a mucous ſubſtance, which facilitates the motions of the ſpine.

Genga, an Italian anatomiſt, long ago obſerved†, that the change which takes place in theſe intervertebral cartilages, (as they are uſually called,) in advanced life, occaſions the decreaſe in ſtature, and the ſtooping forwards, which are uſually to be obſerved in old people. The cartilages then become ſhrivelled, and conſequently loſe, in a great meaſure, their elaſticity. But, beſides this gradual effect of old age, theſe cartilages are ſubject to a temporary dimi-

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[*] Morgagni Adverſar. iii.

[†] Iſtoria Anat. dell' Oſſa e Muſcoli del Corpo Umano.

nution, from the weight of the body in an erect poſture, ſo that people who have been long ſtanding, or have carried a conſiderable weight, are found to be ſhorter than when they have been long in bed. Hence we are taller in the morning than at night. This fact, though ſeemingly obvious, was not aſcertained till of late years *. The difference in ſuch caſes depends on the age, and ſize of the ſubject; in tall, young people, it will be nearly an inch; but in older, or ſhorter perſons, it will be leſs conſiderable.

Besides the connection of the ſeveral vertebræ, by means of theſe cartilages, there are likewiſe many ſtrong ligaments, which unite the bones of the ſpine to each other. Some of theſe ligaments are external, and others internal. Among the external ligaments, we obſerve one which is common to all the vertebræ, extending, in a longitudinal direction, from the fore part of the body of the ſecond vertebra of the neck, over all the other vertebræ, and becoming broader as it deſcends towards the os ſacrum, where it

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* Phil. Tranſact. 1724.—Mem. de l'Acad. des Sciences, 1725.

becomes thinner, and gradually diſappears. This external longitudinal ligament, if we may ſo call it, is ſtrengthened by other ſhorter ligamentous fibres, which paſs from one vertebra to another, throughout the whole ſpine. The internal ligament, the fibres of which, like the external one, are ſpread in a longitudinal direction, is extended over the back part of the bodies of the vertebræ, where they help to form the cavity of the ſpine, and reaches from the foramen magnum of the occipital bone to the os ſacrum.

We may venture to remark, that all the vertebræ diminiſh in denſity and firmneſs of texture, in proportion as they increaſe in ſize; ſo that the lower vertebræ, though larger, are not ſo heavy in proportion as thoſe above them. In conſequence of this mode of ſtructure, the ſize of the vertebræ is increaſed without adding to their weight; and this is an object of no little importance, in a part of the body, which, beſides flexibility and ſuppleneſs, ſeems to require lightneſs as one of its eſſential properties.

In the fœtus, at the ordinary time of birth, each vertebra is found to be compoſed of three bony pieces, connected by cartilages which afterwards oſſify. One of theſe pieces is the body of the bone; the other two are the poſterior and lateral portions, which form the foramen for the medulla ſpinalis. The oblique proceſſes are at that time complete, and the tranſverſe proceſſes beginning to be formed; but the ſpinous proceſſes are totally wanting.

Of the Cervical Vertebræ.

THESE are ſeven in number—their bodies are ſmaller and of a firmer texture than the other bones of the ſpine. The tranſverſe proceſſes of theſe vertebræ are ſhort, and forked for the lodgment of muſcles; and, at the bottom of each of theſe proceſſes, there is a foramen, for the paſſage of the cervical artery and vein. The ſpinous proceſs of each of theſe vertebræ is likewiſe ſhorter than in the other vertebræ, and forked at its extremity; by which means it allows a more convenient inſertion to the muſcles of the neck. Their oblique proceſſes are more deſerving of that name than either thoſe of the dorſal or lumbar vertebræ. The uppermoſt of theſe proceſſes are ſlightly concave, and the lowermoſt ſlightly convex. —This may ſuffice for a general deſcription of theſe vertebræ; but the firſt, ſecond, and ſeventh, deſerve to be ſpoken of more particularly.—The firſt, which is called *Atlas*, from its ſupporting the head, differs from all the other vertebræ of the ſpine. It forms a kind of bony ring, which may be divided into its anterior and poſterior arches, and its lateral portions. Of theſe, the anterior arch is the ſmalleſt and flatteſt; at the middle of its convex fore part we obſerve a ſmall tubercle, which is here what the body is in the other vertebræ. To this tubercle a ligament is attached, which helps to ſtrengthen the articulation of the ſpine with the os occipitis. The back part of this anterior portion is concave, and covered with cartilage, where it receives the odontoid proceſs of the ſecond vertebra.—The poſterior portion of the vertebra, or, more properly ſpeaking, the poſterior arch, is larger than the anterior one. Inſtead of a ſpinous proceſs, we obſerve a riſing or tubercle, larger than that which we have juſt now deſcribed, on the fore part of the bone.—The lateral portions of the vertebra project, ſo as to form what are called the tranſverſe proceſſes, one on each ſide, which are longer and larger than the tranſverſe proceſſes of the other vertebræ. They terminate in a roundiſh tubercle, the end of which has a ſlight bend downwards. Like the other tranſverſe proceſſes, they are perforated at their baſis, for the paſſage of the cervical artery.—But, beſides theſe tranſverſe proceſſes, we obſerve, both on the ſuperior and inferior ſurface of theſe lateral portions of the firſt vertebra, an articulating ſurface, covered with cartilage, anſwering to the oblique proceſſes in the other vertebræ. The uppermoſt of theſe are oblong, and ſlightly concave, and their external edges riſe ſomewhat higher than their internal brims. They receive the condyloid proceſſes of the os occipitis, with which they are articulated by a ſpecies of ginglimus. The lowermoſt articulating ſurfaces, or the inferior oblique proceſſes, as they are called, are large, concave, and circular, and are formed for receiving the ſuperior oblique proceſſes of the ſecond vertebra; ſo that the Atlas differs from the reſt of the cervical vertebræ in receiving the bones, with which it is articulated both above and below.

In the fœtus we find this vertebra compoſed of five, inſtead of three pieces, as in the other vertebræ. One of theſe is the anterior arch; the other four are the poſterior arch and the ſides, each of the latter being compoſed of two pieces. The tranſverſe proceſs, on each ſide, remains long in a ſtate of epiphyſis with reſpect to the reſt of the bone.

The ſecond vertebra is called *dentata*, from the proceſs on the upper part of its body, which has been, though perhaps improperly, compared to a tooth. This proceſs, which is the moſt remarkable part of the vertebra, is of a cylindrical ſhape, ſlightly flattened, however, behind and before. Anteriorly it has a convex, ſmooth, articulating ſurface, where it is received by the Atlas, as we obſerved in our deſcription of that vertebra. It is by means of this articulation that the rotatory motion of the head is performed; the articulation of the os occipitis with the ſuperior oblique proceſſes of the firſt vertebra, allowing only a certain degree of motion backwards and forwards, ſo that, when we turn the face either to the right or left, the Atlas moves upon this odontoid proceſs of the ſecond vertebra. But, as the face cannot turn a quarter of a circle, that is, to the ſhoulder, upon this vertebra alone, without being liable to injure the medulla ſpinalis, we find that all the cervical vertebræ concur in this rotatory motion, when it is in any conſiderable degree; and indeed we ſee many ſtrong ligamentous fibres ariſing from the ſides of the odontoid proceſs, and paſſing over the firſt vertebra, to the os occipitis, which not only ſtrengthen the articulation of theſe bones with each other, but ſerve to regulate and limit their motion. It is on this account that the name of *moderators* has ſometimes been given to theſe ligaments.

The tranſverſe proceſſes of the vertebra dentata are ſhort, inclined downwards, and forked at their extremities. Its ſpinous proceſs is ſhort and thick. Its ſuperior oblique proceſſes are ſlightly convex, and ſomewhat larger than the articulating ſurfaces of the firſt vertebra, by which mechaniſm, the motion of that bone upon this ſecond vertebra is performed with greater ſafety. Its inferior oblique proceſſes have nothing ſingular in their ſtructure.

The ſeventh vertebra of the neck differs from the reſt chiefly in having its ſpinous proceſs of a greater length, ſo that, upon this account, it has been ſometimes called *vertebra prominens*.

Of the Dorſal Vertebræ.

THESE vertebræ, which are twelve in number, are of a middle ſize, between the cervical and lumbar vertebræ; the upper ones gradually loſing their reſemblance to thoſe of the neck, and the lower ones coming nearer to thoſe of the loins.—The bodies of theſe vertebræ are more flattened at their ſides, more convex before, and more concave behind, than the other bones of the ſpine.—Their upper and lower ſurfaces are horizontal.—At their ſides we obſerve two depreſſions, one at their upper, and the other at their lower edge, which, united with ſimilar depreſſions in the vertebræ above and below, form articulating ſurfaces, covered with cartilage, in which the heads of the ribs are received. Theſe depreſſions, however, are not exactly alike in all the dorſal vertebræ; for we find the head of the firſt rib articulated ſolely with the firſt of theſe vertebræ, which has therefore the whole of the ſuperior articulating ſurface within itſelf, independent of the vertebra above it. We may likewiſe obſerve a ſimilarity in this reſpect in the eleventh and twelfth of the dorſal vertebræ, with which the eleventh and twelfth ribs are articulated ſeparately.—Their ſpinous proceſſes are long, flattened at the ſides, divided at their upper and back part into two ſurfaces by a middle ridge, which is received by a ſmall groove in the inner part of the ſpinous proceſs immediately above it, and connected to it by a ligament. Theſe ſpinous proceſſes are terminated by a kind of round tubercle, which ſlopes conſiderably downwards, except in the three lowermoſt vertebræ, where they are ſhorter and more erect.—Their tranſverſe proceſſes are of conſiderable length and thickneſs, and are turned obliquely backwards. Anteriorly they have an articulating ſurface, for receiving the tuberoſity of the ribs, except in the eleventh and twelfth of the dorſal vertebræ, to which the ribs are articulated by their heads only. In the laſt of theſe vertebræ the tranſverſe proceſſes are very ſhort and thick, becauſe otherwiſe they would be apt to ſtrike againſt the lowermoſt ribs, when we bend the body to either ſide.

Of the Lumbar Vertebræ.

THESE, which are the loweſt of the true vertebræ, are five in number. They are larger than the dorſal vertebræ. Their bodies are extremely prominent, and nearly of a circular form at their fore part; poſteriorly they are concave. Their intermediate cartilages are of conſiderable thickneſs, eſpecially anteriorly, by which means the curvature of the ſpine forwards, towards the abdomen, in this part, is greatly aſſiſted. Their ſpinous proceſſes are ſhort and thick, of conſiderable breadth, erect, and terminated by a kind of tuberoſity. Their oblique proceſſes are of conſiderable thickneſs; the ſuperior ones are concave, and turned inwards; the inferior ones convex, and turned outwards.—Their tranſverſe proceſſes are thin, and long, except in the firſt and laſt vertebra, where they are much ſhorter, that the lateral motions of the trunk might not be impeded. The inferior ſurface of all theſe vertebræ is ſlightly oblique, ſo that the fore part of the body of each is ſomewhat thicker than its hind part; but this is more particularly obſervable in the lowermoſt vertebra, which is connected with the os ſacrum.

Of the Falſe Vertebræ.

WE have already obſerved that theſe are compoſed of two bones, viz. the os ſacrum and os coccygis.

Of the Os Sacrum.

THE os ſacrum derives its name from its being offered in ſacrifice by the ancients, or rather from its ſupporting the organs of generation, which they conſidered as ſacred.

In young ſubjects it is compoſed of five or ſix pieces, united by cartilage; but in more advanced age it becomes one bone, in which, however, we may ſtill eaſily diſtinguiſh the marks of the former ſeparation. Its ſhape has ſometimes been compared to an irregular triangle; and ſometimes, and perhaps more properly, to a pyramid, flattened before and behind, with its baſis placed towards the lumbar vertebræ, and its point terminating in the coccyx. We find it convex

vex behind, and ſlightly concave before, with its inferior portion bent a little forwards. Its anterior ſurface is ſmooth, and affords four, and ſometimes five, tranſverſe lines, of a colour different from the reſt of the bone. Theſe are the remains of the intermediate cartilages, by which its ſeveral pieces were united in infancy.—Its poſterior convex ſurface has ſeveral prominences, the moſt remarkable of which are its ſpinous proceſſes; theſe are uſually three in number, and gradually become ſhorter, ſo that the third is not ſo long as the ſecond, nor the ſecond as the firſt. This arrangement enables us to ſit with eaſe.—Its tranſverſe proceſſes are formed into one oblong proceſs, which becomes gradually ſmaller as it deſcends.—At the ſuperior part of the bone we obſerve two oblique proceſſes, of a cylindrical ſhape, and ſomewhat concave, which are articulated with the laſt of the lumbar vertebræ. At the baſe of each of theſe oblique proceſſes is a notch, which, with ſuch another in the vertebra above it, forms a paſſage for the twenty-fourth ſpinal nerve. In viewing this bone, either before or behind, we obſerve four, and ſometimes five, holes on each ſide, ſituate at each extremity of the tranſverſe lines we deſcribed as marking the diviſions of the bone. Of theſe holes, the anterior ones, and of theſe again, the uppermoſt, are the largeſt, and afford a paſſage to the nerves. The poſterior holes are ſmaller, covered with membranes, and deſtined for the ſame purpoſe as the former. Sometimes at the bottom of the bone there is only a notch, and ſometimes there is a hole common to it and the os coccygis.

The cavity, between the body of this bone and its proceſſes, for the lodgment of the ſpinal marrow, is triangular, and becomes ſmaller as it deſcends, till at length it terminates obliquely on each ſide at the lower part of the bone. Below the third diviſion of the bone, however, the canal is no longer completely bony, as in the reſt of the ſpine, but is defended poſteriorly only by a very ſtrong membrane; hence a wound in this part may be attended with the moſt dangerous conſequences.

This bone is articulated above, as we have ſeen, with the laſt lumbar vertebra; laterally, it is firmly united, by a broad irregular ſurface, to the oſſa innominata, or hip bones; and below, it is joined to the os coccygis. In women the os ſacrum is uſually ſhorter, broader, and more curved, than in men, by which means the cavity of the pelvis is more enlarged.

Of the Os Coccygis.

THIS bone, which has got its name from its ſuppoſed reſemblance to a cuckow's beak, is placed at the extremity of the os ſacrum, and in its figure may be ſaid to reſemble that bone in miniature. It is nearly of a triangular ſhape, convex behind, and concave before, and is originally compoſed of three, and ſometimes of four pieces, which become one bone in the adult ſtate, and, in the old ſubject, are ſometimes found completely oſſified with the os ſacrum.—By ſome writers it has been called *os caudæ*, becauſe the tails of animals are formed by a prolongation of this bone.

It is broadeſt at its upper part, where it is united by a ſlight concave ſurface, lined with cartilage, to the os ſacrum, and from thence it grows narrower to its apex.—It differs very much from the vertebræ, being uſually without proceſſes, and having no cavity for the medulla ſpinalis, or foramina for the paſſage of nerves.—Its chief uſe ſeems to be to ſupport the inteſtinum rectum; and, by its being capable of ſome degree of motion at its articulation with the os ſacrum, and being like that bone bent forwards, we are enabled to ſit with eaſe.—Its motion backwards may likewiſe be uſeful in parturition, by enlarging the inferior opening of the pelvis.

Now that we have finiſhed the anatomical deſcription of the ſpine, it will be right to ſay ſomething of its properties and uſes.—We find the ſpinal marrow lodged in its bony canal, ſecure from external injury.—It defends the thoracic and abdominal viſcera, and forms a pillar which ſupports the head, and gives a general firmneſs to the whole trunk.

To give it a firm baſis, we find the bodies of the vertebræ gradually increaſing in breadth as they deſcend; and to fit it for a variety of motion, it is compoſed of a great number of joints, with an intermediate elaſtic ſubſtance, ſo that to great firmneſs there is added a perfect flexibility.

We have already obſerved, that the lowermoſt and largeſt vertebræ are not ſo heavy in proportion as thoſe above them; their bodies being more ſpongy, excepting at their circumference, where they are more immediately expoſed to preſſure; ſo that nature ſeems every where endeavouring to relieve us of an unneceſſary weight of bone. But behind, where the ſpinal marrow is more expoſed to injury, we find the proceſſes compoſed of very hard bone; and the ſpinous proceſſes are in general placed over each other in a ſlanting direction, ſo that a pointed inſtrument cannot eaſily get between them, excepting in the neck, where they are almoſt perpendicular, and leave a greater ſpace between them. Hence, in ſome countries, it is uſual to kill cattle by thruſting a pointed inſtrument between the occiput and the Atlas, or between the Atlas and the ſecond vertebra.—Beſides theſe uſes of the vertebræ in defending the ſpinal marrow, and in articulating the ſeveral vertebræ, as is the caſe with the oblique proceſſes, we ſhall find that they all ſerve to form a greater ſurface for the lodgment of muſcles, and to enable the latter to act more powerfully on the trunk, by affording them a lever of conſiderable length.

In the neck, we ſee the ſpine projecting ſomewhat forwards, to ſupport the head, which, without this aſſiſtance, would require a greater number of muſcles. Through the whole length of the thorax it is carried in a curved direction backwards, and thus adds conſiderably to the cavity of the cheſt, and conſequently affords more room to the lungs, heart, and large blood-veſſels. In the loins the ſpine again projects forwards, in a direction with the centre of gravity, by which means the body is eaſily kept in an erect poſture, for otherwiſe we ſhould be liable to fall forwards. But, at its inferior part, it again recedes backwards, and helps to form a cavity called the pelvis, in which the urinary bladder, inteſtinum rectum, and other viſcera, are placed.

In a part of the body that is compoſed of ſo great a number of bones, and conſtructed for ſuch a variety of motion, as the ſpine is, luxation is more to be expected than fracture; and this is very wiſely guarded againſt, in every direction, by the many proceſſes that are to be found in each vertebra, and by the cartilages, ligaments, and other means of connection, which we have deſcribed as uniting them together.

SECTION II.

Of the Bones of the Thorax.

THE ancients gave the name of *thorax* to all that part of the body which is included between the clavicles and pubis, but by this name we now underſtand only that cavity of the trunk which is formed by the ſternum, ribs, and dorſal vertebræ.—The laſt of theſe were included in our deſcription of the ſpine.

Of the Sternum.

THE ſternum, os pectoris, or breaſt-bone, is the oblong, flat bone, placed at the fore part of the thorax.—The oſſification of this bone in the fœtus beginning from many different points at the ſame time, we find it, in young ſubjects, compoſed of ſeveral bones, united by cartilages; but, as we advance in life, moſt of theſe cartilages oſſify, and the ſternum, in the adult ſtate, is found to conſiſt of three, and ſometimes only of two pieces, the two lower portions being united into one; and very often, in old ſubjects, the whole is formed into one bone. But, even in the latter caſe, we may ſtill obſerve the marks of its former diviſions; ſo that, in deſcribing this bone, we may very properly divide it into its upper, middle, and inferior portions.

The upper portion forms an irregular ſquare, which, without much reaſon, has, by many writers, been compared to the figure of a heart as it is painted on cards. It is of conſiderable thickneſs, eſpecially at its upper part. Its anterior ſurface is irregular, and ſlightly convex; poſteriorly, it is ſomewhat concave. Its upper middle part is hollowed, to make way for the trachea arteria. On each ſide, ſuperiorly, we obſerve an oblong articulating ſurface, covered with cartilage in the recent ſubject, for receiving the ends of the clavicles.—Immediately below this, on each ſide, the bone becomes thinner, and we obſerve a rough ſurface for receiving the cartilage of the firſt rib, and, almoſt cloſe to the inferior edge of this, we find the half of ſuch another ſurface, which, combined with a ſimilar ſurface in the middle portion of the ſternum, ſerves for the articulation of the cartilage of the ſecond rib.

The middle portion is much longer, narrower, and thinner than the former; but is ſomewhat broader and thinner below than above, where it is connected with the upper portion. The whole of its anterior ſurface is ſlightly convex, and within it is ſlightly concave. Its edge, on each ſide, affords four articulating ſurfaces, for the third, fourth, fifth, and ſixth ribs; and parts of articulating ſurfaces at its upper and lower parts, for the ſecond and ſeventh ribs.—About the middle of this portion of the ſternum we ſometimes find a conſiderable hole, large enough in ſome ſubjects to admit the end of the little finger. Sylvius[*] ſeems to have been the firſt who deſcribed it. Riolanus, and ſome others after him, have, without reaſon, ſuppoſed it to be more frequent in women than in men. In the recent ſubject it is cloſed by a cartilaginous ſubſtance; and, as it does not ſeem deſtined for the tranſmiſſion of veſſels, as ſome writers have aſſerted, we may, perhaps very properly, with M. Hunauld[†], conſider it as an accidental circumſtance, occaſioned by an interruption of the oſſification, before the whole of this part of the bone is completely oſſified.

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[*] De Oſſibus.

[†] Mem. de l'Acad. des Sciences, 1740.

The third and inferior portion of the ſternum is ſeparated from the former by a line, which is ſeldom altogether obliterated, even in the oldeſt ſubjects. It is ſmaller than the other parts of the bone, and deſcends between the ribs, ſo as to have been conſidered as an appendix to the reſt of the ſternum. From its ſhape, and its being conſtantly in a ſtate of cartilage in young ſubjects, it has been commonly named *cartilagio xiphoides*, *enſiformis*, or ſword-like cartilage; though many of the ancients gave the name of xiphoides to the whole ſternum; comparing the two firſt bones to the handle, and this appendix to the blade of the ſword.—The ſhape of this appendix varies in different ſubjects; in ſome it is longer and more pointed, in others ſhorter and more obtuſe. Veſlingius* has ſeen it reaching as low as the navel, and incommoding the motion of the trunk forwards. In general it terminates obtuſely, or in a ſingle point; ſometimes, however, it is bifurcated, and Euſtachius and Haller * have ſeen it trifid. Very often we find it perforated, for the tranſmiſſion of branches of the mammary artery. —In the adult it is uſually oſſified and tipped with cartilage, but it very often continues cartilaginous through life, and Haller † once found it in this ſtate in a woman who died in her hundredth year.

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* Syntagma Anat.

The ſubſtance of the ſternum, internally, is of a light, ſpongy texture, covered externally with a thin bony plate; hence it happens that this bone is eaſily fractured.—From the deſcription we have given of it, its uſes may be eaſily underſtood. We have ſeen it ſerving for the articulation of ſeven true ribs on each ſide, and hence we ſhall find it of conſiderable uſe in reſpiration. We likewiſe obſerved, that it is articulated with each of the clavicles. It ſerves for the origin and inſertion of ſeveral muſcles; it ſupports the mediaſtinum; and, laſtly, de-

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* Phyſiol. tom. vi. 8vo. † Ibid.

fends the heart and lungs: and it is obſervable, that we find a ſimilar bone in almoſt all animals that have lungs, and even in ſuch as have no ribs, of which latter we have an inſtance in the frog *.

Of the Ribs.

THE ribs are the long curved bones, which are placed in an oblique direction at the ſides of the cheſt. Their number is generally twelve on each ſide; but, in ſome ſubjects, it has been found to be thirteen, and in others, though more rarely, only eleven. They are diſtinguiſhed into true and falſe ribs.—The ſeven upper ribs, which are articulated to the ſternum, are called *true* ribs; and the five lower ones, which are not immediately attached to that bone, are called *falſe* ribs. At the poſterior extremity of each rib we obſerve a ſmall head, divided by a middle ridge into two articulating ſurfaces, covered with cartilage, which are received into two cavities contiguous to each other, and formed in the upper and lower part of each dorſal vertebra, as we have already obſerved in our deſcription of the ſpine. This articulation, which is ſecured by a capſular ligament, is a ſpecies of ginglimus, and allows only of motion upwards and downwards. The head of each rib is ſupported by a ſhort neck, and immediately beyond this we find a flattened tubercle, affording an oblong and ſlightly convex ſurface, which is articulated with the tranſverſe proceſs of the loweſt of the two dorſal vertebræ, with which its head is articulated. At ſome little diſtance from this tuberoſity, the rib makes a conſiderable curve, which is uſually called its angle. From the tubercle to the angle the ribs are of conſiderable thickneſs, and approaching to a cylindrical ſhape; but, from the angle to their anterior extremity, they become thinner and flatter. To this anterior extremity is fixed a long, broad, and ſtrong cartilage, which, in each of the true ribs, reaches to the ſternum, where its articulation is ſecured by a capſular ligament, and by other ligamentous fibres. The cartilages of the ſixth and ſeventh ribs being longer than the reſt, are ex-

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* Haller. Phyſ. tom. vi. 8vo.

extended upwards, in order to reach the ſternum, the inferior portion of which is about on a level with the fifth rib. The cartilages of theſe two ribs are uſually united into one, ſo as to leave no ſpace between them—The falſe ribs are ſupported in a different manner. Their cartilages terminate in an acute point before they reach the ſternum, the eighth rib being attached by its cartilage to the lower edge of the cartilage of the ſeventh, or laſt of the true ribs; the ninth in the ſame manner to the eighth, and the tenth to the ninth; the cartilages of each rib being ſhorter than that of the rib above it. The eleventh and twelfth, which are the two lowermoſt ribs, are not fixed at their anterior extremities like the other ribs, but hang looſe, and are ſupported only by their ligamentous fibres, and by muſcles and other ſoft parts.

The external ſurface of each rib is ſomewhat convex, and its internal ſurface ſlightly concave. On the inferior and interior ſurface of theſe bones we obſerve a long foſſa, for the lodgment of the intercoſtal veſſels and nerves. This channel, however, does not extend through the whole length of the rib, being obſervable neither at the poſterior extremity, where the veſſels have not yet reached the bone, nor at the fore end, where they are diſtributed to the parts between the ribs. We ſeldom ſee any marks of it in the ſhort ribs, as in the firſt, ſecond, eleventh, and twelfth.

THUS far we have given a deſcription, which is applicable to the ribs in general; but, as we find them differing from each other in ſhape, length, ſituation, and other reſpects, it will be right to ſpeak of each rib in particular.

THE *firſt* rib, which is the ſhorteſt of any, is likewiſe the moſt curved. It is broader than the other ribs, and, inſtead of being placed, as they are, obliquely, and with its edges upwards and downwards, it is ſituated nearly in a tranſverſe direction, one of its edges being placed inwards, or nearly ſo. Of theſe edges, the inner one is ſharp, and the outer one ſomewhat rounded. Its inner ſurface is ſmooth, and its ſuperior ſurface is ſometimes ſlightly depreſſed anteriorly by the clavicle. The head of this rib, inſtead of being angular, is flattened, and ſlightly convex, being received into a cavity, which is formed wholly in the firſt vertebra, and not by two vertebræ, as is the caſe with the other ribs.

The *ſecond* rib is longer than the firſt, but ſhorter than the ribs below it. Its angle is placed at a ſmall diſtance from its tuberoſity, and its head is articulated with two vertebræ, like the other ribs.—The other ten ribs, the two laſt only excepted, differ from the general deſcription we have given, chiefly in the difference of their length, which goes on gradually increaſing, from the firſt or uppermoſt, to the ſeventh or laſt of the true ribs, and as gradually diminiſhing from that to the twelfth. Their obliquity, in reſpect to the ſpine, likewiſe increaſes as they deſcend, as does the diſtance between the head and angle of each rib, from the firſt rib to the ninth.—The two loweſt ribs differ from all the reſt in the following particulars. Their heads, like that of the firſt rib, are rounded, and received into a cavity formed entirely in the body of one vertebra; they have no tubercle for their articulation with the tranſverſe proceſſes, to which they are only looſely fixed by ligaments, and in this reſpect the tenth rib is ſometimes found to agree with them; they are much ſhorter than the reſt of the falſe ribs, and the twelfth is ſtill ſhorter than the eleventh. The length of the latter, however, is different in different ſubjects, and is not always found to be the ſame on both ſides in the ſame ſkeleton *. Anteriorly, as we have already obſerved, their cartilages are ſhort and looſe, not being attached to the cartilages of the other ribs; and this ſeems to be, becauſe the moſt conſiderable motions of the trunk are not performed on the lumbar vertebræ alone, but likewiſe on the lower vertebræ of the back; ſo that if theſe two ribs had been confined anteriorly, like the reſt, and likewiſe united to the bodies of two vertebræ, and to the tranſverſe proceſs, this diſpoſition would have impeded the motion of the two

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* Haller. Phyſiol. tom. vi. 8vo.

laſt vertebræ of the back, and conſequently would have affected the motion of the trunk in general.

Of the motion and uſes of the ribs we ſhall have occaſion to ſpeak hereafter.

SECTION III.

Of the Pelvis.

THE pelvis, or baſon, is that conſiderable cavity, which forms, as it were, the baſis of the trunk of the ſkeleton. It is compoſed of the os ſacrum, os coccygis, and two oſſa innominata. The two firſt of theſe bones were included in our account of the ſpine, to which they more properly belong.

The oſſa innominata ſeem to have been ſo called from the irregularity of their figure, anatomiſts not having been able to find out any particular form to which they could compare them. This name, however, is now ſo univerſally eſtabliſhed, that it would be needleſs to change it. Each os innominatum, in children, is compoſed of three diſtinct bones, but, as they advance in life, the marks of this ſeparation gradually diſappear, by the oſſification of the cartilages by which they were united to each other; ſo that, about the fourteenth or fifteenth year, ſometimes much ſooner, and ſometimes not till much later, they become one bone, ſtill, however, continuing to retain the names of *ilium*, *iſchium*, and *pubis*, by which their diviſions were originally diſtinguiſhed, and to be deſcribed as three diſtinct bones by all anatomical writers. The os ilium forms the upper and largeſt part of the bone, the os iſchium its poſterior and inferior portion, and the os pubis its anterior part.

Of the Os Ilium.

THE os ilium, or haunch bone, is of a very irregular ſhape. The lower part of it is thick and narrow; its ſuperior portion is broad and thin, terminating in a ridge, called the *ſpine* of the ilium, and more commonly known by the name of *the haunch*. This ſpine riſes up like an arch, being turned ſomewhat outwards, and, from this appearance, the upper part of the pelvis, when viewed together, has not been improperly compared to the wings of a phaeton. This ſpine, in the recent ſubject, appears as if tipped with cartilage; but this appearance is nothing more than the tendinous fibres of the muſcles that are inſerted into it. Externally, this bone is unequally prominent, and hollowed for the attachment of muſcles; and internally, at its broadeſt fore part, it is ſmooth and concave.—At its lower part there is a conſiderable ridge on its inner ſurface. This ridge, which extends from the os ſacrum, and correſponds with a ſimilar prominence, both on that bone and the iſchium, forms, with the inner part of the oſſa pubis, what is called the brim of the pelvis. The whole of the internal ſurface, behind this ridge, is very unequal.

The os ilium has likewiſe a ſmaller ſurface poſteriorly, by which it is articulated to the ſides of the os ſacrum. This ſurface has by ſome been compared to a human ear, and by others to the head of a bird; but neither of theſe compariſons ſeem to convey any juſt idea of its form or appearance. Its upper part is rough and porous; lower down it is more ſolid. It is firmly united to the os ſacrum by a cartilaginous ſubſtance, and likewiſe by very ſtrong ligamentous fibres, which are extended to that bone from the whole circumference of this irregular ſurface.

The ſpine of this bone, which is originally an epiphyſis, has two conſiderable tuberoſities, one anteriorly, and the other poſteriorly, which is the largeſt of the two. The ends of this ſpine too, from their projecting more than the parts of the bone below them, are called ſpinal proceſſes. Before the anterior ſpinal proceſs the ſpine is hollowed, where part of the Sartorius muſcle is placed, and below the poſterior ſpinal proceſs there is a very large niche in the bone, which, in the recent ſubject, has a ſtrong ligament ſtretched over its lower part, from the os ſacrum to the ſharp-pointed proceſs of the iſchium; ſo that a great hole is formed, through which paſs the great ſciatic nerve and the poſterior crural veſſels under the pyriform muſcle, part of which is likewiſe lodged in this hole.—The loweſt, thickeſt, and narroweſt part of the ilium, in conjunction with the other two portions of each os innominatum, helps to form the acetabulum for the os femoris.

Of the Os Iſchium.

THE os iſchium, or hip-bone, which is the loweſt of the three portions of each os innominatum, is of a very irregular figure, and uſually divided into its body, tuberoſity, and ramus.

THE body, externally, forms the inferior portion of the acetabulum, and ſends a ſharp-pointed proceſs backwards, called the ſpine of the iſchium. This is the proceſs to which the ligament is attached, which we juſt now deſcribed as forming a great foramen for the paſſage of the ſciatic nerve.—The tuberoſity is large and irregular, and is placed at the inferior part of the bone, giving origin to ſeveral muſcles. In the recent ſubject it ſeems covered with a cartilaginous cruſt; but this appearance, as in the ſpine of the ilium, is nothing more than the tendinous fibres of the muſcles that are inſerted into it. This tuberoſity, which is the loweſt portion of the trunk, ſupports us when we ſit. Between the ſpine and the tuberoſity we obſerve a ſinuoſity, covered with a cartilaginous cruſt, which ſerves as a pulley, on which the obturator muſcle plays.—From the tuberoſity, the bone becoming narrower and thinner, forms the ramus or branch, which paſſing forwards and upwards, makes, with the ramus of the os pubis, a large hole of an oval ſhape, called the *foramen magnum iſchii*, which affords, through its whole circumference, attachment to muſcles. We ſhall have occaſion to mention this foramen more particularly in deſcribing the os pubis.

Of the Os Pubis.

THE os pubis, or ſhare bone, which is the ſmalleſt of the three portions of the os innominatum, is placed at the upper and fore part of the pelvis, where the two oſſa pubis meet, and are united to each other by means of a very ſtrong cartilage which conſtitutes what is called the *ſymphyſis pubis.*

Each os pubis may be divided into its body, angle, and ramus. The body, which is the outer part, is joined to the os ilium. The angle comes forwards to form the ſymphyſis, and the ramus is a thin apophyſis, which, uniting with the ramus of the iſchium, forms the *foramen magnum iſchii*, or *thyroideum*, as it has been ſometimes called, from its reſemblance to a door or ſhield. This foramen is ſomewhat wider above than below, and its greateſt diameter is, from above downwards, and obliquely from within outwards. In the recent ſubject it is almoſt completely cloſed by a ſtrong fibrous membrane, called the *obturator* ligament.—Upwards and outwards, where we obſerve a nitch in the bone, the fibres of this ligament are ſeparated, to allow a paſſage to the poſterior crural nerve, an artery, and vein. The great uſes of this foramen ſeem to be to lighten the bones of the pelvis, and to afford a convenient lodgment to the obturator muſcles.

The three bones we have deſcribed as conſtituting the os innominatum on each ſide, all concur to form the great acetabulum, or cotyloid cavity, which receives the head of the thigh bone; the os ilium and os iſchium making each about two fifths, and the os pubis one fifth, of the cavity. This acetabulum, which is of conſiderable depth, is of a ſpherical ſhape. Its brims are high, and, in the recent ſubject, are tipped with cartilage. Theſe brims, however, are higher above and externally, than they are internally and below, where we obſerve a nitch in the bone, (which is the iſchium,) acroſs which is ſtretched a ligament, forming a hole for the tranſmiſſion of blood-veſſels and nerves to the cavity of the joint. The cartilage, which lines the acetabulum, is thickeſt at its circumference, and thinner within, where a little hole is to be obſerved in which are placed the mucilaginous glands that ſerve to lubricate the joint, and facilitate its motions. We are likewiſe able to diſcover the impreſſion made by the internal ligament of the os femoris, which, by being attached both to this cavity and to the head of the os femoris, helps to ſecure the latter in the acetabulum.

The bones of the pelvis ſerve to ſupport the ſpine and upper parts of the body, to lodge the inteſtines, urinary bladder, and other viſcera; and likewiſe to unite the trunk to the lower extremities. But, beſides theſe uſes, they are deſtined, in the female ſubject, for other important purpoſes; and the accoucheur finds, in the ſtudy of theſe bones, the foundation of all midwifery knowlege.

Several eminent writers are of opinion, that, in difficult parturition, all the bones of the pelvis undergo a certain degree of ſeparation. It has been obſerved * likewiſe, that the cartilage uniting the oſſa pubis, is thicker, and of a more ſpongy texture, in women than in men, and therefore more

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* Camper. Demonſtrat. Anat. Pathol. lib. 11.

likely to ſwell and enlarge during pregnancy. That many inſtances of a partial ſeparation of theſe bones during labour have happened there can be no doubt; ſuch a ſeparation, however, ought by no means to be conſidered as an uniform and ſalutary work of nature, as ſome writers ſeem to think, but as the effect of diſeaſe.

But there is another circumſtance, in regard to this part of the Oſteology, which is well worthy our attention; and this is, the different capacities of the pelvis in the male and female ſubject. We have already obſerved, that the os ſacrum is ſhorter and broader in women than in men; we likewiſe find the oſſa ilia more expanded; whence it happens, that in women the center of gravity does not fall ſo directly on the upper part of the thigh as in men, and this ſeems to be the reaſon why, in general, they ſtep with leſs firmneſs, and move their hips forwards in walking. — From theſe circumſtances alſo, the brim of the female pelvis is nearly of an oval ſhape, being conſiderably wider from ſide to ſide, than from the ſymphyſis pubis to the os ſacrum; whereas, in man it is rounder, and every where of leſs diameter. Again, we find the inferior opening of the pelvis proportionably larger in the female ſubject, the oſſa iſchia being more ſeparated from each other, and the foramen iſchii larger, ſo that, where the os iſchium and os pubis are united together, they form a greater circle; the os ſacrum alſo is more hollowed, though ſhorter, and the os coccygis more looſely connected, and therefore capable of a greater degree of motion than in men.

Of the Ligaments of the Pelvis.

BESIDES deſcribing the cartilages by which the bones of the pelvis are united with each other, we ſpoke in general terms of their ligaments. But ſome of theſe deſerve to be more particularly noticed.—The articulation of the os ſacrum with the laſt lumbar vertebra, and with the oſſa innominata, is ſtrengthened by means of a ſtrong tranſverſe ligament, which paſſes from the extremity and lower edge of the laſt lumbar vertebra, to the poſterior and internal ſurface of the ſpine of the ilium. Other ligaments are extended poſteriorly from the os ſacrum to the oſſa ilia on each ſide, and, from the direction of their fibres, may be called the lateral ligaments. Beſides theſe, there are, as we have already obſerved, many ſhorter ligamentous fibres, which are ſeen ſtretching from the whole circumference of the articulating ſurfaces of theſe two bones. —But the moſt remarkable ligaments of the pelvis are the two *ſacro-iſchiatic* ligaments, which are placed towards the poſterior and inferior part of the pelvis. One of theſe may be called the greater, and the other the leſſer ſacro-iſchiatic ligament. The firſt of theſe is attached to the poſterior edge of the os ſacrum, to the tuberoſity of the ilium, and to the firſt of the three diviſions of the os coccygis. Its other extremity is inſerted into the inner ſurface of the tuberoſity of the iſchium. At its upper part it is of conſiderable breadth, after which it becomes narrower, but expands again before its inſertion into the iſchium, and, extending along the tuberoſity of that bone to the lower branch of the os pubis, where it terminates in a point, forms a kind of falx, one end of which is looſe, while the other is fixed to the bone.

The leſſer ſacro-iſchiatic ligament is ſomewhat thicker than the former, and is placed obliquely before it. It extends from the tranſverſe proceſſes of the os ſacrum, and the tuberoſity of the ſpine of the ilium on each ſide, to the ſpine of the iſchium. Theſe two ligaments not only ſerve to ſtrengthen the articulation of the oſſa innominata with the os ſacrum, but to ſupport the weight of the viſcera contained in the pelvis, the back and lower part of which is cloſed by theſe ligaments. The poſterior and external ſurface of the greater ligament likewiſe ſerves for the attachment of ſome portions of the gluteus maximus and gemini muſcles.

The ſymphyſis pubis is ſtrengthened internally by a tranſverſe ligament, ſome of the fibres of which are extended to the obturator ligament, of which a deſcription was given in our account of the oſſa pubis.

CHAP.

CHAP. IV.

Of the Extremities.

THIS part of Oſteology is divided into the upper and lower extremities.—The upper extremity conſiſts of the bones of the ſhoulder, arm, fore-arm, and hand; the lower extremity includes the thigh, the leg, and the foot.—We ſhall make each of theſe two diviſions the ſubject of a ſection.

SECTION I.

Of the Upper Extremity.

THE ſhoulder is compoſed of two bones; viz. the clavicula and ſcapula.

Of the Clavicula.

THE clavicula, or collar bone, is a long and nearly cylindrical bone, a little curved at both its extremities like an Italic *ſ*. It has gotten the name of clavicula from its ſuppoſed reſemblance to the key in uſe among the ancients; but it is better named in Engliſh from its ſituation, and we find Celſus * giving it the name of *jugulum*. This bone is ſituated almoſt tranſverſely at the upper, anterior, and lateral part of the thorax, between the ſternum and ſcapula.—Like other long bones, it may be divided into its body or middle part, and its extremities. The body is rather flattened than rounded; its anterior edge is rough and convex; its poſterior edge, ſmooth and concave. Towards its lower and anterior extremity it becomes gradually thicker, and the bone terminates in a head, which is ſlightly convex, and nearly of a triangular ſhape. The inferior ſurface of this extremity is received into a ſuperficial cavity in the firſt bone of the ſternum. In this joint, as in the articulation of the lower jaw with the temporal bone, there is a moveable cartilage, interpoſed between the end of the clavicle and the ſternum, which ſerves to prevent any injury from friction. The capſular ligament is of conſiderable thickneſs and ſtrength. The articulation is likewiſe ſtrengthened by two other ligaments. One of theſe extends from a rough oblique eminence on the inferior ſurface of the clavicle, near the head of the bone, to the upper and internal edge of the cartilage of the firſt rib. Weitbrecht * calls this the *coſto clavicular* ligament; it is nearly of a finger's breadth, and is of great ſtrength. The other, which is common to both clavicles, and has therefore been named the *inter-clavicular* † ligament, is ſtretched tranſverſely over the upper edge of the ſternum, from the head of one clavicle to that of the other. This ligament is ſometimes found double.

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* Lib. viii.

The upper and poſterior extremity of the clavicle, is broader, thinner, and more flattened than the other, and its curvature is in a contrary direction, ſo that its concave edge is forwards, and its convexity backwards.—Its upper ſurface is flattened and ſmooth, but at its under ſurface we find a tubercle, which extends obliquely acroſs the bone. From this tubercle, and a roughneſs near it on the internal edge of the bone, a ſtrong ligament extends to the coracoid proceſs of the ſcapula.—The anterior edge of this extremity of the bone is rough and irregular, but poſteriorly we find a ſmooth, convex, articulating ſurface, tipped with cartilage, which is received into the oblong ſurface we deſcribed in the proceſſus acromion of the ſcapula. This articulation is ſecured by a capſular ligament, and farther ſtrengthened by the ligament we have juſt mentioned as extending to the coracoid proceſs.

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* Syndeſmolog. ſect. 11. † Ibid.

The interior ſtructure of the clavicle is ſimilar to that of other long, round bones. —It is completely oſſified in infants, having no cartilaginous extremities like other bones; but it is leſs curved, and its tubercles and rough portions are leſs remarkable in young ſubjects than in adults.

This bone ſerves to regulate the motions of the ſcapula, by preventing it from being brought too much forwards, or carried too far backwards; and we may conſider it as an axis on which the whole upper extremity rolls, the ſcapula ſerving rather as a ſocket for the os humeri. Accordingly we find, that ſuch animals as make much uſe of their fore-legs or arms, are furniſhed with clavicles. Of this we have inſtances in the ape, bear, bat, mouſe, opoſſum, mole, ſquirrel, and hedge-hog *.—The clavicle likewiſe affords origin to ſeveral muſcles, and ſerves as a defence to the great veſſels and nerves, which, in their way to the upper extremity, paſs between this bone and the firſt rib.

Of the Scapula.

THE ſcapula, or ſhoulder-blade, which approaches nearly to a triangular figure, is fixed, not unlike a buckler, to the upper, poſterior, and lateral part of the thorax, extending from the firſt to about the ſeventh rib.—The anterior and internal ſurface of this bone is irregularly concave, from the impreſſion, not of the ribs, as the generality of anatomiſts have ſuppoſed, but of the ſubſcapularis muſcle. Its poſterior and external ſurface is convex, and divided into two unequal foſſæ by a conſiderable ſpine, which, riſing ſmall from the poſterior edge of the ſcapula, becomes gradually higher and broader as it approaches the anterior and ſuperior angle of the bone, till at length it terminates in a broad and flat proceſs, at the top of the ſhoulder, called the *proceſſus acromion.* On the anterior edge of this proceſſus acromion we obſerve an oblong, concave, articulating ſurface, covered with cartilage, for the articulation of the ſcapula with the clavicle. At its lower part the acromion is hollowed, to allow a paſſage to the ſupra and infra ſpinati muſcles. The ridge of the ſpine affords two rough, flat ſurfaces, for the inſertion of the trapezius and deltoid muſcles.

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* Haller. Phyſiolog. tom. vi. 8vo.

Of the two foſſæ, into which the external ſurface of the bone is divided by the ſpine, the ſuperior one, which is the ſmalleſt, ſerves to lodge the ſupra ſpinatus muſcle; and the inferior foſſa, which is much larger than the other, gives origin to the infra ſpinatus.

The triangular ſhape of the ſcapula leads us to conſider its angles and its ſides.—The upper, poſterior angle, is neither ſo thick, nor has ſo rough a ſurface, as the inferior one; but the moſt remarkable of the three angles of this bone is the anterior one, which is of great thickneſs, and formed into a glenoid cavity of an oval ſhape, the greateſt diameter of which is from below upwards. This cavity, in the recent ſubject, is furniſhed with cartilage, and receives the head of the os humeri. The cartilaginous cruſt, which ſurrounds its brims, makes it appear deeper in the freſh ſubject than in the ſkeleton. A little beyond this glenoid cavity the bone becomes narrower, ſo as to give the appearance of a neck; and above this riſes a conſiderable proceſs, which, from being thick at its origin, become thinner, and, in ſome degree, flattened at its extremity. This proceſs projects conſiderably, and is curved downwards. From its ſuppoſed reſemblance to the beak of a bird, it is called the *coracoid* proceſs. From the whole external ſide of this proceſs, a ſtrong and broad ligament is ſtretched to the proceſſus acromion, becoming narrower as it approaches the latter proceſs, ſo as to be of a ſomewhat triangular ſhape. This ligament, and the two proceſſes with which it is connected, are evidently intended for the protection of the joint, and to prevent a luxation of the os humeri upwards.

Of the three ſides of the ſcapula, the poſterior one, which is the longeſt, is called the *baſis*. This ſide is turned towards the vertebræ.—Its other two ſides are called *coſtæ*. The ſuperior coſta, which is the upper and ſhorteſt ſide, is likewiſe thinner than the other two, having a ſharp edge. It is nearly horizontal, and parallel with the ſecond rib; and is interrupted, near the baſis of the coracoid proceſs, by a ſemi-circular nitch, which is cloſed by a ligament that extends from one end of it to the other, and affords a paſſage to veſſels and nerves. Beſides this paſſage, there are other nitches in the ſcapula, for the tranſmiſſion of veſſels;

viz. one between the coracoid proceſs and the head of the bone, and another between its neck and the proceſſus acromion.—The third ſide of the ſcapula, or the inferior coſta, as it is called, is of conſiderable thickneſs, and extends obliquely from the neck of the bone to its inferior angle, reaching from about the third to the eighth rib.

The ſcapula has but very little cellular ſubſtance, and is of unequal thickneſs, being very thin at its middle part, where it is covered by a great number of muſcles, and having its neck, the acromion, and coracoid proceſs, of conſiderable ſtrength. In the fœtus, the baſis and the neck of the ſcapula, together with its glenoid cavity, acromion, coracoid proceſs, and the ridge of the ſpine, are ſo many epiphyſes with reſpect to the reſt of the bone, to which they are not completely united till a conſiderable time after birth.

The ſcapula is articulated to the clavicle and os humeri, to which laſt it ſerves as a fulcrum; and, by altering its poſition, it affords a greater ſcope to the bones of the arm in their different motions. It likewiſe affords attachment to a great number of muſcles, and poſteriorly ſerves as a defence to the thorax.

Of the Arm.

THE arm, properly ſo called, is formed of a ſingle bone, called *os humeri*. This bone, which is nearly of a cylindrical ſhape, may be divided into its body and its extremities.

Its upper extremity is formed ſomewhat laterally and internally, into a large, round, and ſmooth head, which is admitted into the glenoid cavity of the ſcapula. Around the baſis of this head we obſerve a circular foſſa, deepeſt anteriorly and externally, which forms what is called the neck of the bone, and from the edge of which ariſes the capſular ligament, which is farther ſtrengthened by a ſtrong membranous expanſion, extending to the upper edge of the glenoid cavity and to the coracoid proceſs of the ſcapula;

and likewiſe by the tendinous expanſions of the muſcles, inſerted into the head of the humerus.—This capſular ligament is ſometimes torn in luxation, and becomes an obſtacle to the eaſy reduction of the bone*. The articulating ſurface of the head is covered by a cartilage, which is thick in its middle part, and thin towards its edges, by which means it is more convex in the recent ſubject than in the ſkeleton.—This upper extremity, beſides the round, ſmooth head we have deſcribed, affords two other ſmaller protuberances. One of theſe, which is the largeſt of the two, is of an irregular oblong ſhape, and is placed at the back of the head of the bone, from which it is ſeparated by a kind of groove that makes a part of the neck. This tuberoſity is divided, at its upper part, into three ſurfaces; the firſt of theſe, which is the ſmalleſt and uppermoſt, ſerves for the inſertion of the ſupraſpinatus muſcle; the ſecond, or middlemoſt, for the inſertion of the infraſpinatus; and the third, which is the loweſt and hindmoſt, for the inſertion of the teres minor. The other, ſmaller tuberoſity, is ſituated anteriorly between the larger one and the head of the humerus, and ſerves for the inſertion of the ſubſcapularis muſcle. Between theſe two tuberoſities we obſerve a deep groove, for lodging the tendinous head of the biceps brachii; the capſular ligament of the joint affording here a prolongation, thinner than the reſt of the capſula, which covers and accompanies this muſcle to its fleſhy portion, where it gradually diſappears in the adjacent cellular membrane.

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* Petit des Malad. des Os.—Med. Obſ. et Inq. vol. ii.

Immediately below its neck, the os humeri begins to aſſume a cylindrical ſhape; ſo that here the body of the bone may be ſaid to commence.—At its upper part we obſerve a continuation of the groove for the biceps, which extends downwards, about a fourth part of the length of the bone, in an oblique direction. The edges of this groove are continuations of the greater and leſſer tuberoſities, and ſerve for the attachment of the pectoralis, latiſſimus dorſi, and teres major muſcles. The groove itſelf is lined with a gliſtening ſubſtance like cartilage, but which ſeems to be nothing more than the remains of tendinous fibres.—A little lower down, towards the external and anterior ſide of the middle of the bone, we ſee it riſing into a rough ridge, for the inſertion of the deltoid muſcle. On each ſide of this ridge the bone is ſmooth and flat, for the lodgment of the brachialis internus muſcle; and behind the middle part of the outermoſt ſide of the ridge is a channel, for the tranſmiſſion of veſſels into the ſubſtance of the bone. A little lower down, and near the inner ſide of the ridge, we ſometimes obſerve ſuch another channel, which is intended for the ſame purpoſe.

The os humeri, at its lower extremity, becomes gradually broader and flatter, ſo as to have this end nearly of a triangular ſhape. The bone, thus expanded, affords two ſurfaces, of which the anterior one is the broadeſt, and ſomewhat convex; and the poſterior one narrower and ſmoother. The bone terminates in four large proceſſes, the two outermoſt of which are called *condyles*, though not deſigned for the articulation of the bone.—Theſe condyles, which are placed at ſome diſtance from each other, on each ſide of the bone, are rough and irregular protuberances, formed for the inſertion of muſcles and ligaments, and differ from each other in ſize and ſhape.—The external condyle, when the arm is in the moſt natural poſition, is found to be placed ſomewhat forwarder than the other. The internal condyle is longer, and more protuberant than the external. From each of theſe proceſſes a ridge is continued upwards at the ſides of the bone. A fold of the tendinous faſcia, that covers the bones of the arm, adheres to each of theſe ridges. Theſe tendinous productions, from being broad near the condyles, become narrower as they aſcend, and terminate about the middle of the bone.—Winſlow and others who have miſtaken them for ligaments, call them the *lateral* or *intermuſcular ligaments* of the os humeri. From each of the condyles a ſtrong ligament goes out to the bones of the fore-arm.

In the interval between the two condyles, are placed the two articulating proceſſes, contiguous to each other, and covered with cartilage. One of theſe, which is the ſmalleſt, is formed into a ſmall, obtuſe, ſmooth head, on which the radius plays. This little head is placed near the external condyle, as a part of which it has been ſometimes deſcribed*. The other, and larger proceſs, is compoſed of two lateral protuberances and a middle cavity, all of which are ſmooth, and covered with cartilage. From the manner in which the ulna moves upon this proceſs, it has gotten the name of *trochlea*, or pulley. The ſides of this pulley are unequal; that which is towards the little head is the higheſt of the two; the other, which is contiguous to the external condyle, is more ſlanting, being ſituated obliquely from within outwards, ſo that when the fore-arm is fully extended, it does not form a ſtraight line with the os humeri, and, for the ſame reaſon, when we bend the elbow, the hand comes not to the ſhoulder, as it might be expected to do, but to the fore part of the breaſt.

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* Monro on the Bones.

There is a cavity at the root of theſe proceſſes, on each of the two ſurfaces of the bone. The cavity on the anterior ſurface, is divided, by a ridge, into two, the external of which receives the end of the radius, and the internal one lodges the coronoid proceſs of the ulna in the flexions of the fore-arm. The cavity on the poſterior ſurface, at the baſis of the pulley, is much larger, and lodges the olecranon when the arm is extended.

The internal ſtructure of the os humeri is ſimilar to that of other long bones. In new-born infants, both the ends of the bone are cartilaginous, and the large head, with the two tubercles above, and the condyles, with the two articulating proceſſes below, become epiphyſes before they are entirely united to the reſt of the bone.

We have ſeen how the os humeri is articulated at its upper part to the ſcapula. This articulation is a perfect arthrodia, and, on comparing the ſize of the head of the bone with the ſmall ſocket that receives it, it evidently appears deſigned for a free and extenſive motion to every ſide: we can bring it forwards, raiſe it, or carry it backwards, and, by a ſucceſſion of theſe motions, deſcribe a circle; but in this the ſcapula and clavicle will be found greatly to aſſiſt.—Of its articulation below with the bones of the fore-arm, we ſhall have occaſion to ſpeak hereafter.

Of the Fore-Arm.

THE fore-arm is compoſed of two long bones, the ulna and radius; the firſt of theſe forms the internal and poſterior part; and the ſecond, the external and anterior part.

Of the Ulna.

THE ulna is ſmaller and ſhorter than the os humeri, and becomes gradually ſmaller as it deſcends to the wriſt.—We may divide it into its upper and lower extremities, and its body or middle part. At its upper extremity are two conſiderable proceſſes, of which the poſterior one and largeſt is named *olecranon*, and the ſmaller and anterior one, the *coronoid* proceſs. Between theſe two proceſſes, the extremity of the bone is formed into a deep articulating cavity, which, from its ſemi-circular ſhape, is called the *greater ſygmoid cavity*, to diſtinguiſh it from another, which has been named the *leſſer ſygmoid cavity.*

The olecranon begins by a conſiderable tuberoſity, which is rough, and ſerves for the inſertion of muſcles, and terminates in a kind of hook, the concave ſurface of which moves upon the pulley of the os humeri.—This proceſs forms the point of the elbow.—The coronoid proceſs is ſharper at its extremity than the olecranon, but is much ſmaller, and does not reach ſo high. In bending the arm it is received into the foſſa at the fore part of the pulley.—At the external ſide of the coronoid proceſs is the leſſer ſygmoid cavity, which is a ſmall, ſemilunar, articulating ſurface, lined with cartilage, on which the round head of the radius plays.—At the fore part of the coronoid proceſs we obſerve a ſmall tuberoſity, into which the tendon of the brachialis internus is inſerted.

The greater ſygmoid cavity, the ſituation of which we juſt now mentioned, is divided into four ſurfaces by a prominent line which is interſected by a ſmall ſinuoſity that ſerves for the lodgment of mucilaginous glands. —The whole of this cavity is covered with cartilage.

The body, or middle part of the ulna, is of a priſmatic or triangular ſhape, ſo as to afford three ſurfaces and as many angles. The external and internal ſurfaces are flat and broad, eſpecially the external one, and are ſeparated by a ſharp angle, which, from its ſituation, may be termed the internal angle. This internal angle, which is turned towards the radius, ſerves for the attachment of the ligament that connects the two bones, and which is therefore called the *interoſſeous* ligament.—The poſterior ſurface is convex, and correſponds with the olecranon.

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non. The borders, or angles, which ſeparate it from the other two ſurfaces, are ſomewhat rounded. At about a third of the length of this bone from the top, in its fore part, we obſerve a channel for the paſſage of veſſels.

The lower extremity is ſmaller as it deſcends, nearly cylindrical, and ſlightly curved forwards and outwards. Juſt before it terminates it contracts, ſo as to form a neck to the ſmall head with which it ends. On the outſide of this little head, anſwering to the olecranon, a ſmall proceſs, called the *ſtyloid* proceſs, ſtands out, from which a ſtrong ligament is ſtretched to the wriſt. The head has a rounded articulating ſurface, on its internal ſide, which is covered with cartilage, and received into a ſmall ſemilunar cavity, formed at the lower end of the radius.—Between this convex ſurface and the ſtyloid proceſs, the head is flattened at its ſummit, and covered with cartilage. Between it and the os cuneiforme, a moveable cartilage is interpoſed, which is continued from the cartilage that covers the lower end of the radius, and is connected by ligamentous fibres to the ſtyloid proceſs of the ulna.

We have ſeen how the ulna is articulated above with the lower end of the os humeri. This articulation is of the ſpecies called ginglimus.—We have likewiſe ſeen that it is articulated both above and below to the radius, and to the carpus at its loweſt extremity. Its chief uſe ſeems to be to ſupport and regulate the motions of the radius.

In children, both extremities of this bone are firſt cartilaginous, and afterwards epiphyſes, before they are completely united to the reſt of the bone.

Of the Radius.

THIS bone has gotten its name from its ſuppoſed reſemblance to the ſpoke of a wheel, or to a weaver's beam *; and ſometimes, from its ſupporting the hand, it has been called *manubrium manus.*—Like the ulna, it is of a triangular figure, but it differs from that bone, in growing larger as it deſcends, ſo that its ſmaller part anſwers to the larger part of the ulna, and *vice verſa.*

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* Monro on the Bones.

Of its two extremities, the uppermoſt and ſmalleſt is formed into a ſmall rounded head, furniſhed with cartilage; and hollowed at its ſummit, for an articulation with the little head at the ſide of the pulley of the os humeri. The round border of this head, next the ulna, is formed for an articulation with the leſſer ſygmoid cavity of that bone. This little head of the radius is ſupported by a neck, at the bottom of which, laterally, is a conſiderable tuberoſity, into the poſterior half of which is inſerted the tendon of the biceps, while the anterior half is covered with cartilage, and ſurrounded with a capſular ligament, ſo as to allow this tendon to ſlide upon it as upon a pulley.—Immediately below this tuberoſity, the body of the bone may be ſaid to begin. We find it ſlightly curved throughout its whole length, by which means a greater ſpace is formed for the lodgment of muſcles, and it is enabled to croſs the ulna without compreſſing them. Of the three ſurfaces, to be diſtinguiſhed on the body of the bone, the external and internal ones are the broadeſt and flatteſt. The anterior ſurface is narrower and more convex. Of its angles, the external and internal ones are rounded; but the poſterior angle, which is turned towards the ulna, is formed into a ſharp ſpine, which ſerves for the attachment of the interoſſeous ligament, of which mention was made in our deſcription of the ulna. This ſtrong ligament, which is a little interrupted above and below, ſerves not only to connect the bones of the fore-arm to each other, but likewiſe to afford a greater ſurface for the lodgment of muſcles. On the fore part of the bone, and at about one third of its length, from its upper end, we obſerve a channel for veſſels, ſlanting obliquely upwards. Towards its lower extremity, the radius becomes broader, of an irregular ſhape, and ſomewhat flattened, affording three ſurfaces, of which the poſterior one is the ſmalleſt; the ſecond, which is a continuation of the internal ſurface

The lateral ligaments may be diſtinguiſhed into external and internal, or, according to Winſlow, into *brachio radialis*, and *brachio cubitalis*. They both deſcend laterally from the loweſt part of each condyle of the os humeri, and, from their fibres ſpreading wide as they deſcend, have been compared to a gooſe's foot. The internal ligament, or brachio cubitalis, which is the longeſt and thickeſt of the two, is attached to the coronoid proceſs of the ulna.—The external ligament, or brachio radialis, terminates in the circular ligament of the radius. Both theſe ligaments adhere firmly to the capſular ligament, and to the tendons of ſome of the adjacent muſcles.

In conſidering the articulation of the fore-arm with the os humeri, we find, that, when both the bones are moved together upon the os humeri, the motion of the ulna upon the pulley allows only of flexion and extenſion; whereas, when the palm of the hand is turned downwards or upwards, or, in other words, in pronation and ſupination, we ſee the radius moving upon its axis, and, in theſe motions, its head turns upon the little head of the os humeri at the ſide of the pulley, while its circular edge rolls in the leſſer ſygmoid cavity of the ulna.

At the lower end of the fore-arm we have ſeen that the edge of the ulna is received into a ſuperficial cavity at the ſide of the radius.—This articulation, which is ſurrounded by a looſe capſular ligament, concurs with the articulation above, in enabling the radius to turn with great facility upon its axis; and it is chiefly with the aſſiſtance of this bone, that we are enabled to turn the palm of the hand upwards or downwards, the ulna having but a very inconſiderable ſhare in theſe motions.

Of the articulation of the bones of the fore arm with the carpus, we ſhall have occaſion to ſpeak more particularly in our deſcription of the latter.

Of the Hand.

THE hand, which is the only part of the upper extremity that remains to be deſcribed, is compoſed of many bones, very different from each other in their ſhape and ſituation, and which are therefore very properly divided into three claſſes of carpus, metacarpus, and fingers.

Of the Carpus.

THE *carpus*, or wriſt, is compoſed of eight bones, diſpoſed in two irregular rows, four in each row. Thoſe of the upper row are placed next to the bones of the fore-arm, while thoſe of the under row ſupport the thumb, and the bones of the metacarpus. —Theſe bones are ſo irregular, and ſo different from each other in their ſhape, that it is a taſk of no little difficulty to deſcribe them clearly.—In general they may be ſaid to have ſix unequal ſurfaces. Suppoſing, therefore, the hand to be laid flat on a table, with the palm downwards, the upper ſurface of each carpal bone will be that which is towards the back of the hand; and the under ſurface that which is towards the palm of the hand; the poſterior ſurface will be that which is neareſt to the bones of the fore-arm, and the anterior ſurface that which is placed towards the fingers: of the two lateral ſurfaces, the external one will be that which is neareſt to the thumb, and the internal one that which is towards the little finger, or the inner ſide of the hand.—It will be neceſſary to have all theſe diſtinctions in remembrance, when we are conſidering each of theſe bones ſeparately.

The ancients ranged the bones of the carpus by numbers, but this ſometimes proved a ſource of miſtake; becauſe, what one writer called the firſt bone, was perhaps by another conſidered as the fourth. It was better, therefore, to give to each bone a particular name; and this ſeems to have been firſt done by Lyſerus*. The names he gave them are ſome of them not very expreſſive of their figure; but, as they are now pretty generally received, we think it right to retain them, except that of κοτυλοειδὲς, which was given to one of theſe bones by Lyſerus, on account of its ſinus that receives a part of the os magnum, but which, by later writers, has been more uſually named *ſcaphoides*, though ſeemingly with very little reaſon, as it does not appear to have any ſtriking reſemblance to a boat.—It will be neceſſary to ſay ſomething of each of theſe bones.

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* Cultor. Anatom. lib. v.

The *os ſcaphoides*, or *naviculare*, is ſituated the moſt externally of the uppermoſt row, (conſidering the thumb as the outer ſide of the hand,) and is received into the articulating ſurface at the end of the radius. Its upper ſurface, which helps to form the back of the hand, is convex; below, it is oblong and concave. On its ſmooth convex ſurface we obſerve a foſſa, running in an oblique direction, and ſerving for the attachment of the common ligament of the joint of the wriſt.—The lower diviſion of the bone is divided into two portions, one of which is joined to the trapezium, and the other to the trapezoides.—Its concavity receives a great part of the head of the os magnum.

The *os lunare*, or *lunatum*, which is leſs than the ſcaphoides, has a ſmooth convex ſurface, which is received into the articulating cavity of the radius.—Its outer ſide, which is joined to the ſcaphoides, is ſhaped like a creſcent, and hence the bone has its name.—Its internal lateral ſurface is flat, and broader than the external one, for its articulation with the os cuneiforme. Its anterior ſurface is concave, and divided into two portions, one of which receives part of the head of the os magnum, while the other is articulated with part of the os unciforme.

The *os cuneiforme*, which is placed internally with reſpect to the laſt deſcribed bone, is broader above and towards the back of the hand, than it is below and forwards, and hence is compared to a wedge.—It is leſs than either of the preceding bones.—Its poſterior and convex ſurface is oppoſed to the lower end of the ulna, between which and this bone, as we have before obſerved, there is a moveable cartilage.—Its external lateral ſurface is ſmooth, oblique, and ſlightly concave, for its articulation with the os lunare.—Its anterior ſurface is likewiſe oblique, and ſomewhat concave, and is joined to part of the os unciforme.

THESE three bones, viz. the os ſcaphoides, os lunare, and os cuneiforme, make an oblong articulating ſurface, by which they are articulated to the fore-arm. This ſurface is covered by a cartilage, which extends from the os ſcaphoides to the os lunare, and from the latter to the os cuneiforme. This articulation is ſurrounded by a ſtrong capſular ligament, which is farther ſtrengthened by two lateral ligaments, one of which, or the external ligament, extends from the ſtyloid proceſs of the radius to the os ſcaphoides, while the other, or internal ligament, is attached to the ſtyloid proceſs of the ulna, and to the os cuneiforme.

THE *os piſiforme,* or pea-like bone, though uſually claſſed among the bones of the upper row, is neither placed in the ſame line with them, nor does it help to form the oblong head which is articulated with the fore-arm. This bone, which is ſmaller than either of the three we have deſcribed, is fixed to the under ſurface of the os cuneiforme, ſo as to be prominent forwards into the palm of the hand. That part of the bone, which is placed towards the os cuneiforme, is ſlightly concave; the reſt of it is irregularly rounded.

The four bones of the ſecond row anſwer to the bones of the thumb and fingers. The *trapezium*, which ſupports the thumb, is broadeſt above, where it helps to form the back of the hand, and where it has four unequal ſides and angles, from which it has gotten its name. Towards the palm of the hand it is formed into an oblique protuberance. It is ſlightly concave where it receives a part of the os ſcaphoides, and convex where it is connected with the firſt bone of the thumb, to which it ſerves as a pulley. one of its lateral ſurfaces helps to form the border of the hand, on the ſide next the thumb; the other is ſlightly concave, for its articulation with the os trapezoides.

The *os trapezoides*, like the laſt deſcribed bone, takes its name from the ſhape of its ſuperior ſurface, which is that of an irregular quadrangle. It is ſomewhat larger than the os piſiforme, but ſmaller than any of the other bones of the carpus. It is placed between the trapezium and the os magnum. At its inferior ſurface it is narrower than above, and is rough and convex. It has a ſmall concave ſurface towards the os ſcaphoides, by which it is articulated to that bone, and is ſomewhat convex where it joins the metacarpal bone of the index, or fore finger. Of its lateral ſurfaces, the external one, which is contiguous to the trapezium, is ſlightly convex; the internal one is narrower and flatter, for its articulation with the os magnum.

The *os magnum*, which is ſo named from its being the largeſt bone of the carpus, is of an irregular, oblong ſhape, and formed into a round head poſteriorly towards the os ſcaphoides and os lunare, where it is articulated with thoſe bones. Its anterior end is oblique and ſlightly concave, for its articulation with the metacarpal bone of the middle finger. Its upper ſurface, where it helps to form the back of the hand, is convex, and ſomewhat broader than its under ſurface, which is likewiſe convex. Of its lateral ſurfaces, the external one is ſhort and ſmooth, for its articulation with the os trapezoides, and the internal one longer, and ſomewhat concave, for its articulation with the os unciforme.

The *os unciforme* is not much ſmaller than the laſt deſcribed bone. Its upper ſurface is convex, and nearly of a triangular ſhape. Its lower ſurface is narrower, ſlightly concave, and has ſtanding out from it, into the palm of the hand, a broad proceſs, which, from its hook-like appearance, has occaſioned the bone to be named unciforme. Its poſterior ſurface is oblique, and ſlightly concave, for its articulation with the os cuneiforme, and a ſmall portion of the os lunare. Anteriorly it is ſomewhat convex, and divided into two ſurfaces, one of which is joined to the metacarpal bone of the little finger, and the other to the metacarpal bone of the ring finger. Its external lateral ſurface, which is broad and flat, is contiguous to the os magnum, while its internal lateral ſurface helps to form the inner border of the hand.

All theſe bones are in a cartilaginous ſtate in the fœtus. The oſſification begins in the center of each, and is not entirely completed till the age of eight or ten years. In the adult, they are compoſed of a ſtrong bony lamella, and of an internal cellular ſubſtance.

Their poſterior and anterior ſurfaces, and likewiſe the lateral ſurfaces by which they are articulated to each other, are covered with cartilage.

The articulation of the three firſt bones with the fore-arm, has already been ſpoken of. This articulation, which ſeems to partake both of ginglimus and arthrodia, allows of motion to all ſides; but the carpus has no motion round its axis independent of the radius.

The articulation of the bones of the ſecond row, poſteriorly with thoſe of the firſt, and anteriorly with thoſe of the metacarpus, is ſuch as to allow a ſlight degree of motion backwards and forwards. The connection of the bones laterally with each other, can admit only of a very obſcure motion.

All theſe bones are firmly connected to each other by a great number of ſhort and very ſtrong ligaments, which extend from one bone to another, and are farther ſtrengthened by two conſiderable ligamentous expanſions, which may be called the external and internal *annular* ligaments of the wriſt. The firſt of theſe is ſtretched obliquely over the convex ſurface of the carpus, from the os piſiforme to the ſtyloid proceſs of the radius. This ligament is an inch and a half in breadth, and ſerves to bind down the extenſor tendons of the wriſt and fingers, by attaching itſelf to the little protuberances that ſeparate them.—The internal annular ligament is ſpread tranſverſely at the inſide of the carpus, and is attached on one ſide to part of the os ſcaphoides and trapezium, and on the other, to the os piſiforme and os unciforme; ſerving to bind down the flexor tendons of the wriſt and fingers, and, by this mechaniſm, facilitating the action of their muſcles.

Of the Metacarpus.

THE metacarpus conſiſts of thoſe four bones which are placed between the carpus and fingers. Each of theſe, like other long bones, may be divided into its body or middle part, and its extremities.

THE body is irregularly cylindrical, and ſomewhat flattened on the back part of the bone towards the fingers, by the tendons of the extenſors of the fingers. It is likewiſe flattened at the ſides; and, on its internal ſurface, we obſerve a ſharp ridge, which ſeparates the muſcles that are placed on each ſide of the bone.—The upper extremity, or that end which is joined to the carpus, is uſually called the *baſis* of the bone. It is of an irregular ſhape, flattened, and ſomewhat oblong, with a ſmall cavity for its articulation with the carpus, and a ſmooth and flat ſurface at the ſides, where theſe bones are contiguous to each other.—The lower extremity, or head of the bone, as it is called, which is joined to the fingers, is formed into an oblong, ſmooth head, the convexity of which is inclined ſomewhat inwards. It has a ſlight concavity at its back part, for the paſſage of tendons, and is flattened at its ſides by the preſſure of the next metacarpal bone. Around this head a rough ring is obſervable, to which the capſular ligament is attached; and at the root of it, on each ſide, we find a ſmall tubercle, to which the ligaments are fixed that go from one of theſe bones to the other.

These bones reſemble other long bones in their ſtructure, and in being cartilaginous at both ends at the time of birth. Their articulation with the carpus, and with each other, is by the planiform or fourth ſpecies of diarthroſis; and their motion is the more confined by the very ſtrong ligaments which are ſpread from one to the other.—Thus far the deſcription we have given is applicable to theſe bones in general; but, as they differ from each other in certain particulars, it will be right to ſay ſomething of each.

The firſt, or metacarpal bone of the fore finger, is the longeſt of the four. At its baſis we may obſerve three articulating ſurfaces. The largeſt is ſlightly hollowed, for its articulation with the os trapezoides; and on the outſide of this is a very ſmall flat ſurface, which is joined to the trapezium. The third ſurface, which is on its inner ſide, is for its articulation with the metacarpal bone of the middle finger.—The fore part of this baſis is prominent, where the flat tendon of the *flexor carpi radialis* is inſerted; and its back part is flatted, for the inſertion of the long tendon of the *extenſor carpi radialis*.

The ſecond bone, or that which ſupports the middle finger, in the generality of ſubjects is not quite ſo long as the firſt. Its baſis ſlants obliquely outwards, and affords a broad ſuperficial cavity, which is articulated with the os magnum.

The third, or metacarpal bone of the ring finger, is neither ſo long nor ſo large as either of the two former. At its baſis, which is ſemi-circular and convex, it is connected with the os magnum and the os unciforme.

The fifth, or metacarpal bone of the little finger, is the ſmalleſt and ſhorteſt of all. Its baſis ſlants irregularly inwards, and is articulated with the os unciforme.—It has only one lateral articulating ſurface, and this is on its external ſide, where it is contiguous to the laſt deſcribed bone.—At the poſterior and upper part of this bone we obſerve a prominence, where the *extenſor carpi ulnaris* is inſerted.—This metacarpal bone enjoys a much greater motion than any of the reſt.

Of the Fingers.

EVERY body knows the number and names of the fingers.—Each of them is compoſed of three bones, which, from their diſpoſition in three rows, have been uſually called *phalanges.*

The bones of the firſt phalanx have a thick baſis, formed into a ſuperficial cavity, furniſhed with cartilage, and rough round its edges, for the inſertion of ligaments. Their articulation with the bones of the metacarpus is by arthrodia, ſo that they can be moved laterally or circularly, but have no rotation round their axis.—Their body, or middle part, is convex externally, and ſlightly concave before. Their lower extremity terminates in a pulley, the convexity of which is inclined towards the inſide of the hand. At its ſides we obſerve ſmall tubercles, for the inſertion of ligaments.

The bones of the ſecond phalanx differ from thoſe of the firſt, chiefly in being ſmaller, and in having their baſes formed for an articulation with the pulley juſt now mentioned. This articulation is by ginglimus.—The extremities of this, as well as of the firſt phalanx, are cartilaginous in the fœtus, and become epiphyſes before they are completely united to the reſt of the bone.

The bones of the third phalanx are ſtill leſs than thoſe of the ſecond. Their articulation with the ſecond phalanx is by ginglimus, in the ſame manner as this latter is joined to the firſt phalanx. Both theſe articulations are ſecured by capſular and lateral ligaments, and their motion is confined to flexion and extenſion.—This third phalanx, in young ſubjects, is cartilaginous, except at its baſis.

The phalanges of the ſeveral fingers differ from each other only in their ſize, the thumb alone excepted, of which, on this account, it will be right to give a ſeparate deſcription. Its ſituation, when compared with that of the fingers, is ſomewhat oblique. The firſt bone reſembles the bones of the metacarpus, but is ſomewhat ſhorter and thicker. Its baſis is adapted to the pulley of the trapezium. Its head is uſually hollowed laterally in the adult ſkeleton, for the reception of two oſſa ſeſamoidea, of which we ſhall ſpeak more particularly at the end of the Oſteology.

The ſecond bone anſwers to the deſcription we gave of the firſt phalanx of the other fingers, only that the cavity in its baſis is more oblong.—The third bone differs from the third phalanx only in being broader and thicker.—The firſt bone of the thumb being leſs confined than the metacarpal bones of the fingers, is capable of a greater variety of motion.

The uſes of the hand are ſo obvious in all the common actions of life, that it may be thought ſuperfluous to enumerate them here; and yet I cannot help obſerving, how admirably the whole is conſtructed to anſwer the purpoſes for which it is intended. We ſee that one half of it has only an obſcure motion, in compariſon to what the other has; ſo that we may conſider the former as ſerving as a baſis to the latter. But yet, obſcure as the motion of the bones of the carpus is upon each other, we find that, by being compoſed of many bones, and by each bone's yielding a little, the carpus is enabled to accommodate itſelf to the different motions of the hand. We ſee likewiſe how the metacarpus, by being compoſed of ſeveral bones, enables us to form a hollow in the palm of the hand, eſpecially by theſe bones being placed on the arched carpus, while the ſpaces between them ſerve for the lodgment of muſcles. And how greatly the multiplicity of bones in the hand (for there are twenty-ſeven in each) is eſſential to the different motions we wiſh to perform, may be ſtill farther exemplified in the ſtructure of the fingers; it being obvious, that if each finger was compoſed of one bone, inſtead of three, it would be impoſſible for us to graſp any thing. Laſtly, we may obſerve, that the convexity of the back part of the hand renders the whole fabric ſtronger, while the hollow on the inſide not only enables us to perform many offices of the hand with greater facility, but affords a ſafe paſſage to the numerous veſſels, nerves, and tendons of the fingers.

SECTION II.

Of the Lower Extremities.

EACH lower extremity conſiſts of the thigh, the leg, and the foot.

Of the Thigh.

THE thigh is compoſed only of one bone, called *os femoris*, which is larger and ſtronger than any other bone of the body. —Its upper extremity, like the os humeri, affords three conſiderable proceſſes; theſe are the head, the trochanter major, and trochanter minor.—The head, which forms about two thirds of a ſphere, is turned inwards, and is received into the great cotyloid cavity of the os innominatum, with which it is articulated by enarthroſis. We find it covered by a cartilage, which is thick in its middle part, and thin at its edges, but which is wanting in its lower internal part, where a round, ſpongy foſſa is obſervable, to which the ſtrong ligament, uſually, though improperly, called the *round* one, is attached. This ligament, which, from its ſituation, may be named the internal ligament of the os femoris, is about an inch in length, flattiſh, and of a triangular ſhape, having its narrow extremity attached to the foſſa we have juſt now deſcribed, while its broader end is fixed obliquely to the rough ſurface near the inner and anterior edge of the cotyloid cavity of the os innominatum, ſo that it appears ſhorter internally and anteriorly than it does externally and poſteriorly. In ſome ſubjects, though rarely, this ligament is ſeparated into two portions, one of which, and the moſt conſiderable, adheres to the tuberoſity of the iſchium, and paſſing in at the nitch we obſerved in the inner edge of the cotyloid cavity, is fixed to the head of the os femoris, while the other ſmaller portion is attached, as uſual, to the cotyloid cavity, and to the head of the femur*. Genga† tells us, that he once found this ligament totally wanting in each thigh bone, but that the capſular ligament was thicker and ſtronger than uſual.

The head of the os femoris is ſupported obliquely, with reſpect to the reſt of the bone, by a ſmaller part, called the *cervix*, or *neck*, which, in the generality of ſubjects, is about an inch in length. At its baſis we obſerve two oblique ridges, which extend from the trochanter major to the trochanter minor. Of theſe ridges, the poſterior one is the moſt prominent. Around this neck is attached the capſular ligament of the joint, which likewiſe adheres to the edge of the cotyloid cavity, and is ſtrengthened anteriorly by many ſtrong ligamentous fibres, which begin from the lower and anterior part of the ilium, and ſpreading broader as they deſcend, adhere to the capſular ligament, and are attached to the anterior oblique ridge at the bottom of the neck of the femur. Poſteriorly we find other ſtrong ligamentous fibres, which are fixed by one end to the lower and poſterior edge of the cotyloid cavity, and by the other to the back part of the great trochanter. Other ligamentous fibres again, are ſtretched from the edges of the foramen magnum iſchii to the leſſer trochanter.—Thus we find this articulation very ſtrongly ſecured.

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* Schwenke. *Hæmatologia, &c. cui accedit Obſerv. Anatom. de acetabuli Ligamento externo, Caput Femoris firmante.* Hagæ, 1743. 8vo.

† *Anatomia Chirurgica.*

Posteriorly and externally, from the baſis of the neck of the bone, a large, unequal

equal protuberance ſtands out, which is the *trochanter major*. The upper edge of this proceſs is ſharp and pointed poſteriorly, but is more obtuſe anteriorly. A part of it is rough and unequal, for the inſertion of muſcles; the reſt is ſmooth, and covered with a thin cartilaginous cruſt, between which, and the tendon of the glutæus maximus that ſlides over it, a large burſa mucoſa is interpoſed. Anteriorly, at the root of this proceſs, and immediately below the bottom of the neck, is a ſmall proceſs, called *trochanter minor*. Its baſis is nearly triangular, having its two upper angles turned towards the head of the femur and the great trochanter, while its lower angle is placed towards the body of the bone. Its ſummit is rough and rounded.—Theſe two proceſſes have gotten the name of *trochanters*, from the muſcles that are inſerted into them being the principal inſtruments of the rotatory motion of the thigh.

Immediately below theſe two proceſſes the body of the bone may be ſaid to begin. It is ſmooth and convex before, but is made hollow behind by the action of the muſcles. In the middle of this poſterior concave ſurface we obſerve a rough ridge, called *linea aſpera*, which ſeems to originate from the trochanters, and extending downwards, divides at length into two branches, which terminate in the tuberoſities near the condyles.—At the upper part of it, blood-veſſels paſs to the internal ſubſtance of the bone, by a hole that runs obliquely upwards.

The lower extremity of the os femoris is larger than the upper one, and ſomewhat flattened, ſo as to form two ſurfaces, of which the anterior one is broad and convex, and the poſterior one narrower and ſlightly concave.—This end of the bone terminates in two large protuberances, called *condyles*, which are united before ſo as to form a pulley, but are ſeparated behind by a conſiderable cavity, in which the crural veſſels and nerves are placed ſecure from the compreſſion to which they would otherwiſe be expoſed in the action of bending the leg. Of theſe two condyles, the external one is the largeſt; and when the bone is ſeparated from the reſt of the ſkeleton, and placed perpendicularly, the internal condyle projects leſs forwards, and deſcends nearly three tenths of an inch lower than the external one; but, in its natural ſituation, the bone is placed obliquely, ſo that both condyles are then nearly on a level with each other. At the ſide of each condyle, externally, there is a tuberoſity, the ſituation of which is ſimilar to that of the condyles of the os humeri. We have already obſerved, that the two branches of the linea aſpera terminate in theſe tuberoſities, which are rough, and ſerve for the attachment of ligaments and muſcles.

We have ſeen how the os femoris is articulated above to the os innominatum. From the oblique ſituation of the head, with reſpect to the body of the bone, it is evident that the latter can enjoy little or no rotatory motion, although the former commonly moves round its axis; but this rolling of the head of the bone ſerves for the flexion and extenſion of the thigh, ſo that, without its being turned much out of its ſocket, we are able to perform the moſt neceſſary motions.—Of the articulation of this bone below, with the patella and tibia, we ſhall have occaſion to ſpeak hereafter.

The internal ſtructure of the os femoris is ſimilar to that of other long bones. In new-born children all its proceſſes are cartilaginous, and the two extremities become epiphyſes before they are completely united to the reſt of the bone. The body of the bone is then much ſtraighter than it is in adults, in whom we find it ſlightly curved forwards. This curvature, which is uſeful, by affording a greater ſpace for the lodgment of muſcles at the back of the thigh, and by enabling us to croſs the thighs upon each other with greater eaſe, ſeems to be gradually effected, in ſome degree, by the weight of the body, but chiefly, perhaps, by the action of the flexor muſcles of the leg, which ariſe from the lower and poſterior part of the pelvis, and are inſerted into the upper and poſterior parts of the tibia and fibula. The condyles, likewiſe, may contribute ſomewhat to this effect, by having their convexity almoſt entirely behind *. The poſition of the two thighs, with reſpect to each other, is ſuch, that they are widely ſeparated above, but are brought nearer together at the knees. This poſition, which ſeems to depend on the obliquity of the neck of the os femoris, is the means of affording a more conſiderable ſpace above, for the lodgment of muſcles and other ſoft parts. It likewiſe enables to walk with greater facility and firmneſs; for, unleſs the two feet were brought together, we ſhould be under the neceſſity of performing, at every ſtep, a very conſiderable motion; nor ſhould we be able to lift one leg till we had thrown the weight of the body upon the other; whereas, at preſent, the ſlighteſt agitation is ſufficient. —Women, as I have already obſerved †, from the greater width of the female pelvis, uſually ſtep with leſs firmneſs, and perform a greater motion in walking than men.

Of the Leg.

THE leg is compoſed of three bones, two of which, viz. the tibia and fibula, are long bones, placed at the ſide of each other; the third is a ſmall flat bone, ſituated at the fore part of the joint of the knee, and called *rotula.*

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* Sabatier. Traité d'Anatomie, tome i.

† See p. 149.

Of the Tibia.

THE tibia, which derives its name from its reſemblance to the muſical pipe of the ancients, is the long, thick, triangular bone, which is placed at the inner part of the leg.

THE upper extremity of this bone is large, and flattened at its ſummit, where we obſerve two articulating ſurfaces, a little concave, and ſeparated from each other by an intermediate irregular protuberance. Of theſe two cavities, the internal one is deepeſt, and of an oblong ſhape, while the external one is rounded, and more ſuperficial. Each of theſe, in the recent ſubject, is covered by a cartilage, which extends to the intermediate protuberance, where it terminates. Theſe two little cavities receive the condyles of the os femoris, and the eminence between them is admitted into the cavity which we ſpoke of as being between the two condyles; ſo that this articulation affords a ſpecimen of the complete ginglimus.—Behind the intermediate protuberance, or tubercle, is a pretty deep depreſſion, which ſerves for the attachment of a ligament, and likewiſe to ſeparate the two cavities from each other.—Under the edge of the external cavity is a circular, flat ſurface, covered with cartilage, which ſerves for the articulation of the fibula; and at the fore part of the bone is a conſiderable tuberoſity, of an inch and a half in length, to which the ſtrong ligament of the rotula is fixed.

The body of the tibia is ſmaller than its extremities, and, being of a triangular ſhape, affords three ſurfaces. Of theſe, the external one is broad, and ſlightly hollowed by muſcles above and below; the internal ſurface is broad and flat, and the poſterior ſurface is narrower than the other two, and nearly cylindrical. This laſt has a ſlight ridge running obliquely acroſs it, from the outer ſide of the upper end of the bone to about one third of its length downwards. A little below this we obſerve a paſſage for the medullary veſſels, which is pretty conſiderable, and ſlants obliquely downwards. —Of the three angles which ſeparate theſe ſurfaces, the anterior one, from its ſharpneſs, is called the *ſpine*, or *ſhin*. This ridge is not ſtrait, but deſcribes a figure like an Italic *ſ*, turning firſt inwards, then outwards, and laſtly inwards again.—The external angle is more rounded, and ſerves for the attachment of the interoſſeous ligament; and the internal one is more rounded ſtill by the preſſure of muſcles.

The tibia enlarges again a little at its lower extremity, and terminates in a pretty deep cavity, by which it is articulated with the uppermoſt bone of the foot. This cavity, in the recent ſubject, is lined with cartilage. Its internal ſide is formed into a conſiderable proceſs, called *malleolus internus*, which, in its ſituation, reſembles the ſtyloid proceſs of the radius. This proceſs is broad, and of conſiderable thickneſs, and from it ligaments are extended to the foot. At its back part we find a groove, lined with a thin layer of cartilage, in which ſlide the tendons of the flexor digitorum longus, and of the tibialis poſticus; and a little behind this is a ſmaller groove, for the tendon of the flexor longus pollicis. On the ſide oppoſite to the malleolus internus, the cavity is interrupted, and immediately above it is a rough triangular depreſſion, which is furniſhed with cartilage, and receives the lower end of the fibula.

The whole of this lower extremity of the bone ſeems to be turned ſomewhat outwards, ſo that the malleolus internus is ſituated more forwards than the inner border of the upper extremity of the bone.

In the fœtus both ends of the tibia are cartilaginous, and become afterwards epiphyſes.—We ſhall defer ſpeaking of its connections and uſes, till we have deſcribed the fibula and rotula.

Of the Fibula.

THE fibula is a ſmall long bone, placed on the outſide of the tibia. Its upper extremity does not reach quite ſo high as that part of the tibia, but its inferior end deſcends ſomewhat lower.—Like other long bones, we may divide it into its body or middle part, and its extremities.

Its upper extremity is formed into an irregular head, on the inſide of which is a ſlightly concave articulating ſurface, which, in the recent ſubject, is covered with cartilage, and receives the circular flat ſurface we deſcribed under the edge of the external cavity of the tibia. This articulation is ſurrounded by a capſular ligament, which is farther ſtrengthened by other ſtrong ligamentous fibres, ſo as to allow only a ſmall motion backwards and forwards.—We may refer this articulation to the planiform, or fourth ſpecies of diarthroſis.—Externally, this head of the fibula is rough and protuberant, ſerving for the attachment of ligaments, and for the inſertion of the biceps cruris muſcle.—Immediately below it, on its inner ſide, is a tubercle, from which a part of the gaſtrocnemius internus has its origin.

Immediately below this head the body of the bone begins. It is of a triangular ſhape, and appears as if it were ſlightly twiſted at each end in a different direction. It is likewiſe a little curved inwards and forwards. This curvature is in part owing to the action of muſcles; and in part, perhaps, to the careleſſneſs of nurſes *.—Of the three angles of the bone, that which is turned towards the tibia is the moſt prominent, and ſerves for the attachment of the interoſſeous ligament, which, in its ſtructure and uſes, reſembles that of the fore-arm, and, like that, is a little interrupted above and below.—The three ſurfaces of the bone are variouſly impreſſed by different muſcles. About the middle of the poſterior ſurface, we obſerve a paſſage for the medullary veſſels, ſlanting downwards.

The lower end of the fibula is formed into a ſpongy, oblong head, externally rough and convex, internally ſmooth, and covered with a thin cartilage, where it is received by the external triangular depreſſion at the

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* Monro on the Bones.

lower end of the tibia. This articulation, which reſembles that of its upper extremity, is furniſhed with a capſular ligament, and farther ſtrengthened by ligamentous fibres, which are ſtronger and more conſiderable than thoſe we deſcribed above. They extend from the tibia to the fibula, in an oblique direction, and are more eaſily diſcernible before than behind. Below this the fibula is lengthened out, ſo as to form a conſiderable proceſs, called *malleolus externus*, or the outer ancle. It is ſmooth, and covered with cartilage on the inſide, where it is contiguous to the aſtragalus, or firſt bone of the foot. At the lower and inner part of this proceſs we find a ſpongy cavity, filled with fat; and a little beyond this, poſteriorly, is a cartilaginous groove, for the tendons of the peroneus longus and peroneus brevis, which are here bound down by the ligamentous fibres that are extended over them.

The principal uſes of this bone ſeem to be, to afford origin and inſertion to muſcles, and to contribute to the articulation of the leg with the foot. Of this articulation we ſhall have occaſion to ſpeak hereafter. Its ſituation with reſpect to the tibia is ſuch, that as that bone forms the internal and anterior, ſo this forms the external, and, in ſome meaſure, the poſterior part of the leg; inſomuch, that if a ſword, or any other ſharp inſtrument, were to be plunged between the two bones of each leg, it would paſs behind the two tibias, and before the two fibulas *.—In new-born children both ends of the fibula are cartilaginous, and become epiphyſes before they are completely united to the body of the bone.

Of the Rotula.

THE rotula, patella, or knee-pan, as it is differently called, is a ſmall flat bone, which, in ſome meaſure, reſembles the common figure of the heart with its point downwards, and is placed at the fore part of the joint of the knee.

It is thicker in its middle part than at its edge.—Anteriorly, it is a little convex, and rough for the inſertion of muſcles and ligaments; poſteriorly, it is ſmooth, covered with cartilage, and divided by a middle longitudinal ridge, into two ſlightly concave ſurfaces, of which the external one is the largeſt and deepeſt. They are both exactly adapted to the pulley of the os femoris. The edges of this poſterior ſurface are rough and prominent, where the capſular ligament is attached, and below, we find a roughneſs at the point of the bone, where the upper extremity of a ſtrong tendinous ligament is fixed, which joins this bone to the tuberoſity at the upper end of the tibia. This ligament is of conſiderable thickneſs, about an inch in breadth, and upwards of two inches in length.

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* Sabatier, Traité d'Anatomie, tome i.

The rotula is compoſed internally of a cellular ſubſtance, covered by a thin bony plate; but its cells are ſo extremely minute, that the ſtrength of the bone is, upon the whole, very conſiderable.—In new born children it is entirely cartilaginous.

The uſe of this bone ſeems to be, to defend the articulation of the joint of the knee from external injury.—It likewiſe tends to increaſe the power of the muſcles which act in the extenſion of the leg, by removing their direction farther from the center of motion, in the manner of a pulley.—When we conſider the manner in which it is connected with the tibia, we find that it may very properly be conſidered as an appendix to the latter, which it follows in all its motions, ſo as to be to the tibia what the olecranon is to the ulna; with this difference, however, that the rotula is moveable, whereas the olecranon is a fixed proceſs. Without this mobility, the rotatory motion of the leg would have been prevented.

Of the Joint of the Knee.

THIS complicated articulation could not well be underſtood, till all the bones of the leg had been deſcribed.—On viewing it in the recent ſubject, we ſee all the fore part of the joint covered by an expanſion of the *faſcia lata*, under which we find the rotula connected to the tibia below, as we have already obſerved, by a ſtrong ligament, and re-

retained in its ſituation above by the tendons of the extenſor muſcles of the leg, which are inſerted into it.

The whole joint is ſurrounded by a capſular ligament, which is fixed to the lower extremity of the femur, adhering laterally to the edges of the condyles, and extending higher up poſteriorly and anteriorly, ſo as to include the whole of the pulley.—We then find it adhering all round the head of the tibia, and likewiſe to the prominent edge we deſcribed on the poſterior ſurface of the rotula.—This capſula is covered externally by other ligaments, which, from their ſituation, are called the *lateral* and *poſterior* ligaments.

The lateral ligaments, which are two in number, are diſtinguiſhed into external and internal.—The external lateral ligament is fixed to the tuberoſity we deſcribed above the outer condyle of the thigh. It extends downwards about two inches in length, its fibres ſpreading ſomewhat wider as it deſcends, and it terminates on the anterior part of the head of the fibula. The internal lateral ligament is broader and longer than the other. It is attached to the tuberoſity above the inner condyle of the os femoris, and its fibres ſpreading wider as they deſcend, are fixed to the upper and inner ſide of the tibia, extending downwards more than two inches upon that bone.—The ſituation of theſe two ligaments is not immediately at the middle of the joint on each ſide, but a little backwards. This poſition is a greater ſecurity to the articulation, and while it facilitates the natural flexion and extenſion of the leg, helps to prevent its being bent backwards. In this latter reſpect, the joint is farther ſecured by the third external ligament, which, from its ſituation, is called the *poſterior* ligament, being fixed to the lower and back part of the external condyle of the os femoris, from whence it is ſpread ſomewhat obliquely to the upper, and poſterior part of the tibia, where it terminates.

On opening the capſular ligament, we find other ligaments within the cavity of the joint. Theſe are three in number. The two moſt conſiderable ones interſect each other, and are therefore called the *croſs* ligaments. They are placed at the back part of the joint, and, from their ſituation with reſpect to each other, may be diſtinguiſhed into the anterior and poſterior ligaments. They are both fixed by one of their extremities, to the cavity we obſerved between the two condyles at the back of the os femoris, the anterior ligament adhering to the outer, and the poſterior ligament to the inner ſide of that cavity. The former is faſtened by its other extremity to the inner part of the tubercle, which ſeparates the two articulating cavities of the tibia, while the other, or poſterior ligament, is fixed in the depreſſion which is immediately behind that tubercle. The anterior ligament is the moſt oblique of the two, the other being almoſt perpendicular. They are both connected at their back part with the inner ſurface of the capſular ligament, and anteriorly we find them covered with fat. Theſe two ligaments croſs each other when we turn the point of the foot inwards, but ſeparate from each other when the foot is turned outwards. Their chief uſe ſeems to be to prevent the leg's being brought farther than to a ſtraight line with the thigh, that the body may be ſupported by a firm perpendicular column *. They likewiſe prevent the leg's being turned inwards, while they favour its rotation outwards.—The third ligament within the joint is a very thin one, which is fixed to the rotula, and to the fore part of the cavity which ſeparates the two condyles of the os femoris. Its chief uſe ſeems to be to prevent the mucilaginous glands from being injured by the motions of the joint.

Besides the cartilages, which we have already had occaſion to deſcribe in ſpeaking of the os femoris, tibia, and rotula, we find two intermediate or moveable cartilages within the cavity of the joint, which, from their ſhape, are called *ſemilunar* cartilages. They are placed one on each ſide of the intermediate protuberance of the tibia, ſo as to cover about two-thirds of each of its two articulating ſurfaces on which they are placed. Their inferior ſurface, which is placed upon the tibia, is flat, while their ſuperior ſurface is ſlightly concave, and adapted to the convexity of the condyles of the os femoris. Their convex edge, which is of conſiderable thickneſs, is turned towards the outer border of each cavity, and is connected with the capſular ligament, while their inner and concave edge, which is much thinner, is placed towards the intermediate protuberance, ſo that their horns or extremities, which are thin, pointed, and nearly ligamentous, are turned towards each other; the anterior extremity of each being connected by a narrow ligament, of about an inch in length, which is ſtretched from one to the other before the intermediate protuberance of the tibia, while their poſterior extremities are fixed to this ſame protuberance by particular ligaments.—The external cartilage ſeems to be more looſely connected, and of courſe to be more moveable than the internal.

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* Monro on the Bones.

These cartilages, like thoſe we deſcribed in ſpeaking of the lower jaw and the ulna, ſerve to prevent any injury from friction, and to adapt themſelves to the different inequalities in the ſeveral motions of the joint, at the ſame time that the thickneſs of their edges increaſes the depth of the articulating cavities.

Having thus deſcribed the different parts of the articulation, the nature of it will be eaſily underſtood.—We have already had occaſion to obſerve, that the articulation of the tibia with the os femoris affords a ſpecimen of the complete ginglimus, which of courſe allows of flexion and extenſion. But, beſides this, we find that the leg has a ſlight degree of rotatory motion upon its axis, which ſeems to be effected chiefly by means of the moveable cartilages, and ſuppoſes the concurrence of other ſpecies of diarthroſis. Thus, in turning the foot inwards or outwards, the inner cavity of the tibia, together with its intermediate cartilage, moves upon the outer condyle of the femur, as upon a pivot, ſo as to afford an inſtance of arthrodia; while the outer articulating cavity of the tibia, ſliding upon the under flat ſurface of its moveable cartilage, reſembles the planiform, or fourth ſpecies of diarthroſis.

Of the Foot.

THE bones of the foot, like thoſe of the hand, are uſually deſcribed in three diviſions, but with different names.—In the hand, we ſpoke of the carpus, metacarpus, and fingers; but the diviſions of the foot are called, the *tarſus*, *metatarſus*, and *toes*.

Of the Tarſus.

THE tarſus is compoſed of ſeven bones, viz. the aſtragalus, os calcis, os naviculare, os cuboides, and three oſſa cuneiformia.

THE *aſtragalus* is the uppermoſt bone of the foot, and the moſt conſiderable in bulk, if we except the os calcis. Its upper part is formed into a large ſmooth head, round the baſis of which is a rough foſſa, that ſerves for the attachment of ligaments. The upper convex ſurface of the head, which reſembles a pulley, is admitted into the cavity of the tibia; the inner ſide of this head is flat and ſmooth, for its articulation with the malleolus internus, while its outer ſide affords another flat but broader ſurface, for its articulation with the malleolus externus. Both theſe lateral ſurfaces are covered with a cartilage, which is continued from the upper convex part of the head, and deſcends lower down on the outer than on the inner ſide. Anteriorly, the aſtragalus is convex, and covered with cartilage, for its articulation with the os naviculare. The under ſurface of the bone affords two articulating ſurfaces, ſeparated by a deep irregular foſſa. The anterior of theſe two ſurfaces is very ſmall, and ſlightly convex; the poſterior one oblong and concave. They both ſerve for the articulation of this bone with the os calcis.

THE *os calcis*, or *calcaneum*, which is the largeſt bone of the foot, is of a very irregular figure. It is long, and ſomewhat flattened at its ſides. Behind, it is formed into a conſiderable tuberoſity, called the *heel*, which is ſlightly hollow above, and rough behind, where the tendo Achillis is inſerted into it. Without this tuberoſity, which ſupports us in an erect poſture, and when we walk, we ſhould be liable to fall backwards. —The upper ſurface of the bone riſes ſo as to form an irregular, oblong, ſmooth prominence, which is adapted to the poſterior concave ſurface of the aſtragalus. The fore part of this prominence is ſeparated by a narrow foſſa, from a ſmall, ſmooth, and ſlightly concave ſurface, ſituated obliquely, and which receives the ſmall convex ſurface we deſcribed at the fore part of the under ſurface of the aſtragalus.—Anteriorly, this bone is formed into an oblong, ſmooth, convex ſurface, which is circular above, and ſomewhat pointed below. This ſurface is adapted to the os cuboides —The lower ſurface of the bone is flat, and immediately beyond this fore part we obſerve two tubercles, one internal, and the other external, which give origin to muſcles. The reſt of this ſurface is concave, for lodging the flexor muſcles, and rough, for the attachment of ligaments.—The external ſide of the bone is flat, and affords a ſuperficial groove for the tendon of the peroneus longus; the internal ſide is hollowed, for the lodgment of muſcles, and for the ſafe paſſage of tendons, nerves, and veſſels.

The *os naviculare*, or *ſcaphoides*, is ſituated between the aſtragalus and the oſſa cuneiformia, at the inner ſide of the foot. Its poſterior ſurface is concave, and adapted to the anterior head of the aſtragalus, and its anterior ſurface convex, affording three articulating ſurfaces, which anſwer to the three cuneiform bones. Of theſe three ſurfaces, the internal one is the largeſt.—Its upper ſurface is convex, and affords a rough foſſa. Its under ſurface is hollow, for the lodgment of muſcles, and rough and unequal, for the attachment of ligaments.—The outer ſide of this bone is rounded, except where it is joined, by a ſemi-circular ſmooth ſurface, to the os cuboides.—On its inner ſide we obſerve a tuberoſity, into which the tendon of the tibialis poſticus is inſerted.

The *os cuboides* is of a very irregular ſhape, and is placed at the outer ſide and at the anterior part of the tarſus. Poſteriorly, it is formed into an oblong, articulating ſurface, which receives the fore part of the os calcis. Anteriorly, it is flat, and ſlightly divided into two articulating ſurfaces, which are connected with the two laſt bones of the metatarſus.—Its upper ſurface is rough and convex; its under ſurface is broader, and affords a conſiderable protuberance, on the fore part of which is a groove, for the tendon of the peronæus longus.—On the inner ſide of the bone are two articulating ſurfaces, covered with cartilage; the foremoſt of theſe is flat and oblong, for its articulation with the os cuneiforme externum; the hindmoſt is ſmall and ſemi-circular, for its articulation with the os naviculare.—The external ſide of the bone, which helps to form the outſide of the foot, is ſhorter and more irregular than the inner ſide.

The *oſſa cuneiformia* are the three wedge-like bones, which are placed by the ſides of each other between the os naviculare and the metarſus, and which, from their ſituation, are uſually diſtinguiſhed into *os cuneiforme externum*, *medium*, and *internum*. They are of unequal bulk, the middle one being the ſmalleſt, and the internal one the largeſt. —We ſhall give a ſeparate deſcription of each.

The *os cuneiforme externum* is of a middle ſize, when compared with the two others. Its upper ſurface forms an oblong ſquare, and, as its ſides extend obliquely downwards, a ſharp edge is formed at the inſide of the foot: hence the bone has the appearance of a wedge. Poſteriorly, it is a little concave, and nearly triangular, where it joins the os naviculare; anteriorly, it is nearly of the ſame ſhape, and ſlightly convex, for ſuſtaining the metatarſal bone of the middle toe.—Its external ſurface is divided into two articulating ſurfaces; the foremoſt and ſmalleſt of the two is joined to the inner ſide of the baſis of the fourth metatarſal bone, while the other and longer ſurface is articulated with the os cuboides. Its inner ſide affords, in the ſame manner, two ſurfaces, for its articulation with the os cuneiforme medium, and the outer ſide of the baſis of the ſecond metatarſal bone.

The *os cuneiforme medium*, or *minimum* as it is ſometimes called on account of its ſize when compared with the other two, is wedged in between four bones.—Its upper ſurface forms a more regular ſquare than the laſt deſcribed bone.—Anteriorly, it is triangular, and ſlightly concave, for its articulation with the ſecond metatarſal bone; poſteriorly, it has a ſimilar ſurface, by which it is joined to the os naviculare. Its external ſide is contiguous to the laſt deſcribed bone, and its internal ſide is joined to the following one.

The *os cuneiforme internum*, or *maximum*, differs from the other two, in having its broad ſquare ſurface placed towards the ſole of the foot, where it is ſlightly concave, for allowing a paſſage to the flexors of the great toe, while its ſmall thin edge, which appears twiſted, is turned upwards. Poſteriorly, it is concave, and ſomewhat triangular,

gular, where it is joined to the os naviculare; anteriorly, it is convex, and of a ſemilunar ſhape, for ſupporting the metatarſal bone of the great toe.—Of its two ſides, the inner one is rough and convex, affording two tubercles below; the external ſide is flat, and conſiſts of two ſmooth ſurfaces, covered with cartilage: the direction of theſe two ſurfaces is nearly at right angles with each other; the poſterior one, which is the largeſt, is joined to the os cuneiforme medium, while the anterior one is connected with the baſis of the ſecond metatarſal bone.

When theſe ſeven bones, which compoſe the tarſus, are joined together, they are convex above, where they help to form the back of the foot, and afford a concavity below, in which the tendons, veſſels, and nerves of the foot are placed ſecure from compreſſion.—Their connections, as we have ſeen, are with one another, and with the bones of the metatarſus, by the planiform or fourth ſpecies of diarthroſis, except the articulation of the aſtragalus with the os naviculare, which is by arthrodia. The aſtragalus is joined to the tibia and fibula by ginglimus, but the articulation being looſe, it allows motion in every direction. All theſe articulations are ſecured by very ſtrong ligaments.

The ligaments which connect the leg and foot, are a capſular, and two lateral ligaments. The capſular ligament is attached to the lower extremities of the tibia and fibula, and adheres all round the upper ſurface and the two lateral ſurfaces of the aſtragalus.—Of the two lateral ligaments, the internal one is ſhort and thick. It begins from the lower, and chiefly from the anterior part of the malleolus internus, and, deſcending ſomewhat obliquely backwards, ſpreading broader as it deſcends, is fixed to the upper part of the inner ſide of the aſtragalus. Some of the fibres of this ligament are ſpread almoſt tranſverſely to the back part of the malleolus internus.—The whole of it is covered by a broad and thick annular ligament, which begins from the lower extremity of the malleolus internus, and, ſpreading wider as it deſcends, is fixed to the inner ſides of the aſtragalus and os calcis. This ligament ſerves to ſtrengthen the articulation of the leg with the foot; but its principal uſe ſeems to be, to bind down the tendons of the flexor longus pollicis, the flexor longus digitorum, and the tibialis poſticus muſcles, and likewiſe to ſecure the veſſels and nerves in their way to the foot. —The external lateral ligament is of greater length and thickneſs, though looſer than the internal one. It begins from the anterior part of the malleolus externus, and, deſcending obliquely backwards, is fixed to the upper and outer part of the os calcis. Beſides this, many other ſtrong fibres, which have been ſometimes deſcribed as a ſeparate ligament, are ſeen extending, almoſt in a tranſverſe direction, from the inner part of the malleolus externus to the back part of the aſtragalus. This external lateral ligament is likewiſe covered by an annular ligament, which, like the one juſt now deſcribed, ſerves rather to bind down the tendons of the foot, than to ſtrengthen the articulation, though it is certainly uſeful in this latter reſpect.—This annular ligament adheres below to the outer ſide of the os calcis, after which it ſeparates into two portions; one of theſe extends to the lower part of the tibia, while the other is fixed to the inner ſide of the aſtragalus and os naviculare.

The bones of the tarſus are likewiſe firmly connected by a great number of ſtrong ligaments, which cover their upper and under ſurfaces in the ſame manner as we obſerved of the bones of the carpus; and when we join the aſtragalus to the os calcis and os naviculare, we find an opening, which, in the recent ſubject, is filled up by ligaments, ſo that the body reſts upon a yielding baſis, by which means we ſuſtain a leſs ſhock in walking or jumping.

All theſe bones are of a very ſpongy texture covered with a compact bony lamella Like the bones of the carpus, they are all in a cartilaginous ſtate in the fœtus, except the aſtragalus and os calcis, both of which are in a great meaſure oſſified at the ordinary time of birth; and the great tuberoſity of the latter, into which the tendo Achillis is inſerted, becomes an epiphyſis before it is completely united to the reſt of the bone.

Of the Metatarſus.

THE metatarſus is made up of five bones, which, in their general characters, agree with thoſe of the metacarpus, but are longer and thicker. The baſis, or poſterior extremity of each, is thicker and more irregular than their anterior extremity, or head, which is rounded. Their body, or middle part is ſomewhat triangular.

The firſt of theſe bones, or the os metatarſi pollicis, is the ſhorteſt and thickeſt of the five. Its baſis affords an oblong articulating ſurface, of a ſemilunar ſhape, which is adapted to the os cuneiforme internum. —Towards the lower edge of this baſis we obſerve a rough tuberoſity, into which the tendon of the peroneus longus is inſerted. —On the outer ſide of the baſis is a ſmall de-

depreſſion, covered with cartilage, for its articulation with the baſis of the ſecond metatarſal bone.—Its body is angular below, and rounded above.—Its head is rounded, and proportioned to the ſize of the bone, affording two oblong cavities on its fore part, ſeparated by a middle ridge, for receiving the oſſa ſeſamoidea.—On the outer ſide of this head is a ſmall depreſſion, made by the ſecond metatarſal bone.

The ſecond metatarſal bone is longer than any of the others. Its baſis affords an oblique ſurface, which is ſupported by the os cuneiforme medium.—At the outer and inner ſides of this baſis, the bone is joined to the os cuneiforme internum and os cuneiforme externum, and immediately above this, on each ſide, we obſerve an articulating ſurface, for its connection with the firſt and third metatarſal bones.

The third metatarſal bone, which ſupports the middle toe, is the ſecond in length. Its baſis, which is triangular and ſlanting outwards, reſts upon the os cuneiforme externum.

The fourth metatarſal is nearly as long as the third, and has a triangular and ſlightly ſlanting baſis, which reſts upon the os cuboides. Beſides its lateral ſurfaces, for its connection with the third and fifth metatarſal bones, the inner ſide of its baſis is impreſſed by the os cuneiforme externum.

The fifth metatarſal bone, or that which ſupports the little toe, is ſhorter than either of the three laſt. Its baſis, which reſts on the os cuboides, is very oblique, large, and tuberous. On its inſide it affords a flat articulating ſurface, where it joins the fourth metatarſal bone. Its external ſide ſlants downwards and backwards, ſo as to form a tuberoſity, into which the tendon of the peroneus brevis, and part of the abductor minimi digiti is inſerted.

Of the Toes.

All the toes, like the fingers, are made up of three bones, except the great toe, which is compoſed only of two bones; and they are likewiſe diſtinguiſhed into phalanges.—The two phalanges of the great toe differ from the two laſt phalanges of the thumb, chiefly in their being proportionally much ſtronger, and in their not being placed obliquely in reſpect of the other toes, as the thumb is to the fingers.—The three phalanges of the other four toes differ from thoſe of the fingers, only in being ſmaller in proportion to their lengths. They are all of them ſmaller at their head than at their baſis, and gradually become ſmaller and ſhorter from the great to the little toe. —This latter, and ſometimes the toe next to it, has the ſecond and third bones intimately united into one. This ſeems to be partly the effect of preſſure, and partly, perhaps, of the little motion for which they are intended.

The internal ſtructure, both of theſe bones and of thoſe of the metatarſus, the ſtate of them in the fœtus, together with their ligaments and articulations, are, in every reſpect, ſimilar to what we formerly obſerved of the metacarpus and fingers.

From the deſcription I have given of the different parts of the foot, their uſes will be eaſily underſtood. We have ſeen how the concavity of the ſole of the foot is uſeful, by affording a ſafe lodgment for muſcles and veſſels. In ſtanding, the os calcis and the fore ends of the metatarſal bones are our only ſupporters, and therefore the former is thick and projects backwards, while the latter are ſtrong, and have only a confined motion; but, in walking, the toes are neceſſary to bring our body, with its centre of gravity, perpendicular to the advanced foot, which they do when the ſole is raiſed *: and although theſe bones do not move upon each other with ſo much eaſe as the bones of the fingers do, yet their number and arrangement ſeem to be perfectly adapted to the functions they are intended to perform.

Of the Oſſa Seſamoidea.

BESIDES the bones we have already deſcribed, as belonging to the extremities, there are others of different figures and ſizes, which, from their ſuppoſed general reſemblance to the ſeeds of the ſeſamum, are called *oſſa ſeſamoidea*. They are found at the articulations of the great toes, and ſometimes at the joints of the thumbs; now and then we meet with them upon the condyles of the os femoris, at the lower extremity of the fibula, under the os cuboides of the tarſus, &c.—They do not exiſt in the fœtus, but, as we advance in life, begin firſt to appear in a cartilaginous ſtate, and, at length, in adult ſubjects, are completely oſſified. Age and hard labour ſeem to add to the number and ſize of theſe bones, and, being moſt commonly found wherever the tendons and ligaments are moſt expoſed to preſſure from the action of the muſcles, they are now generally conſidered by anatomiſts as the oſſified parts of tendons and ligaments.

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* Monro on the Bones.

These bones are uſually ſmooth and flat on the ſide of the bone on which they are placed; their upper ſurface is convex, and, in general, adheres to the tendon that covers it, and of which it may, in ſome meaſure, be conſidered as a part.

Although their formation ſeems to be owing to accidental circumſtances, yet as the two at the firſt joint of the great toe are much larger than the reſt, and are ſeldom wanting in an adult, it would ſeem as if theſe bones were of ſome utility; perhaps by removing the tendons farther from the centre of motion, and thus increaſing the power of the muſcles. The oſſa ſeſamoidea of the great toe and thumb ſeem likewiſe to be of uſe, by forming a groove for lodging the flexor tendons ſecure from compreſſion.

BOOK II.

MYOLOGY.

CHAP. I.

Of the Muſcles in general—the ſtructure of their fibres—their cellular membrane, blood veſſels, lymphatics, and nerves—irritability of the muſcular fibre.—Of the tendons—tendinous faſciæ—motions performed by the muſcles—their names and arrangement.

ALL that ſoft part of the body, which is commonly called *fleſh*, is by anatomiſts, found to conſiſt of various diſtinct maſſes, of a ſoft fibrous texture, and of a red colour, to which they give the name of *muſcles.* Theſe are the organs of motion; for it is by their means that the bones, which may be conſidered as ſo many levers, are moved in different directions, and that all the different motions of the body are performed.

Anatomists uſually diſtinguiſh, in the generality of muſcles, a body, or belly part, and two extremities. The extremities include the ſame number of fibres as the belly of the muſcle, but they are more firmly united together, and degenerate into a firm, gliſtening, and inſenſible ſubſtance, of a white colour, which, as we obſerved in our Introduction, is called *tendon*, if it be round and ſlender; or *aponeuroſis*, if expanded into a broad flat ſurface.—Theſe extremities are uſually diſtinguiſhed into head or origin, and tail or inſertion. Thus the end that adheres to the moſt fixed part is named the head, or origin, and that which is inſerted into the moveable part, is called the tail, or inſertion of the muſcle. Theſe expreſſions are indeed altogether arbitrary, it being well known that the extremities of a muſcle vary with the different ſituations of the body; ſo that parts, which in ſome motions are fixed, become moveable in others. But as ſome terms or other are neceſſary to expreſs our ideas, I ſhall adopt thoſe of *origin* and *inſertion.* They are the moſt generally uſed in this country, and prevent much circumlocution.

In the generality of muſcles, the fibres are placed parallel to each other, in a ſtrait direction, and form what is called a *rectilinear* muſcle; in others, the fibres are placed obliquely with reſpect to the tendons, like the plume of a pen; theſe are ſtiled *penniform* muſcles: ſome conſiſt of two fleſhy portions, with a middle tendon; theſe are called *digaſtric* muſcles: in others, the fibres are radiated, and form what is called a *radiated* muſcle: and there are muſcles whoſe fibres croſs and interſect each other; theſe laſt are, by ſome writers, called *compound* muſcles.

When two or more muſcles concur in the ſame action, they are called *congeneres*; and thoſe which are the inſtruments of oppoſite actions, *antagoniſtæ*: thus, for inſtance, every flexor, or bending muſcle, has a tenſor, or extending muſcle, for its antagoniſt, and *vice verſa.*

Of

Of the Structure of their Fibres.

THE fibres that compoſe the body of a muſcle, are diſpoſed in faſciculi, or bundles, which are eaſily diſtinguiſhable by the naked eye; but theſe faſciculi are diviſible into ſtill ſmaller ones; and theſe again are probably ſubdiviſible *ad infinitum.*

THE moſt minute fibre we are able to trace, ſeems to be ſomewhat plaited; theſe plaits, diſappearing when the fibre is put upon the ſtretch, ſeem evidently to be the effect of contraction, and have probably induced ſome writers to aſſert, that the muſcular fibre is twiſted or ſpiral.

VARIOUS have been the opinions concerning the ſtructure of theſe fibres. They are all of them founded only on conjecture, and therefore we ſhall mention only the principal ones, and this with a view rather to gratify the curioſity of the reader, than to afford him information.

Borelli[*] ſuppoſed them to be ſo many hollow cylinders, filled with a ſpongy medullary ſubſtance, which he compares to the pith of elder, *ſpongioſa ad inſtar ſambuci.* Theſe cylinders, he contends, are interſected by circular fibres, which form a chain of very minute bladders. This hypotheſis has ſince been adopted by a great number of writers, with certain variations. Thus, for inſtance, Borelli ſuppoſes the veſicles to be of a rhomboidal ſhape; whereas Bernouilli contends that they are oval. Cowper went ſo far as to perſuade himſelf that he had filled theſe cells with mercury; a miſtake, no doubt, which aroſe from its inſinuating itſelf into ſome of the lymphatics.—It is obſervable, however, that Leeuwenhoeck ſays nothing of any ſuch veſicles. Here, as well as in many other of her works, Nature ſeems to have drawn a boundary to our inquiries, beyond which no human penetration will probably ever extend. It is, ſurely more commendable, however, to acknowlege our ignorance, than to indulge ourſelves in chimæra.

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[*] De Motu Animalium.

Of their cellular Membrane.

EACH muſcle is ſurrounded by a very thin and delicate covering of cellular membrane, which incloſes it, as it were, like a ſheath, and, dipping down into its ſubſtance, ſurrounds the moſt minute fibres we are able to trace, connecting them to each other, lubricating them by means of the fat which its cells contain in more or leſs quantity in different ſubjects, and ſerving as a ſupport to the blood-veſſels, lymphatics, and nerves, which are ſo plentifully diſtributed through the muſcles.—This cellular membrane, which in no reſpect differs from that we find inveſting and connecting the other parts of the body, has been ſometimes miſtaken for a membrane peculiar to the muſcles; and hence we often find writers giving it the name of *propria membrana muſculoſa*.

Of their Blood Veſſels, Lymphatics, and Nerves.

THE muſcles owe the red colour, which ſo particularly diſtinguiſhes their belly part, to an infinite number of arteries, which are every where diſperſed through the whole of their reticular ſubſtance; for their fibres, after having been macerated in water, are; (like all other parts of the body diveſted of their blood,) found to be of a white colour.

These arteries uſually enter the muſcles by ſeveral conſiderable branches, and ramify ſo minutely through their ſubſtance, that we are unable, even with the beſt microſcopes, to trace their ultimate branches. Ruyſch fancied that the muſcular fibre was hollow, and a production of a capillary artery; but this was merely conjectural.

The veins, for the moſt part, accompany the arteries, but are found to be larger and more numerous.—The lymphatics, likewiſe, are numerous, as might be expected from the great proportion of reticular ſubſtance, which is every where found inveſting the muſcular fibres.

The nerves are diſtributed in ſuch abundance to every muſcle, that the muſcles of the thumb alone*, are ſupplied with a greater proportion of nervous influence than the largeſt viſcera, as the liver for inſtance. They enter the generality of muſcles by ſeveral trunks, the branches of which, like thoſe of the blood-veſſels, are ſo minutely diſperſed through the cellular ſubſtance, that their number and minuteneſs ſoon elude the eye and the knife of the anatomiſt. This has given riſe to a conjecture, as groundleſs as all the other conjectures on this ſubject, that the muſcular fibre is ultimately nervous.

Of the irritability of the Muſcular Fibre.

ALL the parts of the human body, ſome few only excepted, are found to poſſeſs more or leſs of an elaſtic property, or diſpoſition to ſhorten themſelves. This property we obſerve in the dead as well as in the living fibre, in vegetable as well as animal bodies, in the muſical ſtrings prepared from animals, and even in the gluten yielded by animal or vegetable ſubſtances. In the human body we find this property moſt apparent in the muſcles; next to theſe, in the membranes, as the pleura, perioſteum, and mediaſtinum; and leaſt of all, in the tendons, ligaments, and cellular membrane. In the very ſoft parts, as in the pulpy ſubſtance of the brain, and likewiſe in the harder parts, as in the bones and teeth, it is perhaps altogether wanting.

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* Haller. Element. Phyſiolog. tom. iv. 4to.

But we are not, as ſome writers have done, to confound this elaſtic property with another very different one, which is obſervable in animal bodies, and now generally called *irritability*; a term by which we underſtand the contraction that takes place in the muſcular fibre when pricked or irritated. It is to the late learned and illuſtrious M. de Haller that the world is indebted for the inveſtigation of this ſingular property, which had been occaſionally glanced at by different writers*, from the time of the ancients downwards, although it does not appear that any idea was before ſuggeſted of its true nature; it was confounded with ſenſibility, or with the elaſtic property we have juſt now mentioned.

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* The immortal Harvey, in his *Exercitationes de Generatione Animalium*, obſerves, that, in his experiments on living animals, he had found that, when the heart had

Our countryman Gliſſon* ſeems to be the firſt who uſes the word *irritability*, but he employs it in a more vague ſenſe than what we do at preſent; for, although he offers ſome facts to prove that animal fleſh contracts even after death, when irritated by acrid and ſtimulating liquors, and that this contraction is independent of feeling, yet he does not confine this property merely to the muſcular fibre, but allows it to other parts, as to the bones, for inſtance, and even to the juices of the body. Bellini † ſpeaks of a natural contractibility, and explains, on mechanical principles, how any acrid ſubſtance, by irritating the fibres, is expelled by means of this principle. Hence he attempts

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had ceaſed to beat, its motion could be reſtored again by any ſtimulating application, or even by impelling the blood towards it.

[*] De Ventriculo et Inteſtinis.

[†] De Stimulis.

attempts to prove, how irritating ſubſtances may excite the muſcles into action, accelerate the motion of the blood, occaſion inflammation, and produce revulſion or evacuation. Baglivi * gives us ſome obſervations, which are much nearer the mark. He had ſeen fragments of a heart contract, when touched or irritated, independent of ſenſation. — The Stahlians have written a great deal concerning the tone and the natural contraction of the fibres, but they attributed theſe properties entirely to the ſoul. Boerhaave † acknowledged an active power in the heart, and a hidden principle of motion in its pieces when divided; but his ſyſtem of muſcular motion, which he attributes to the nerves, proves that he did not ſuſpect the cauſe of this motion to be in the muſcles themſelves, nor was he aware, that although the nerves may increaſe or diminiſh this property, yet that they are not the immediate cauſe of it. Other writers have made obſervations ſimilar to thoſe of Boerhaave, but it was in the year 1739 that

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* De Fibra Motrice et Morboſa.

† Inſtitut. Rei Medic. § 187.

Haller, in his Commentaries on Boerhaave's Inſtitutions, firſt obſerved, that "the heart "owes its motion to ſome unknown cauſe, "which depends neither on the brain nor on "the arteries, and which lies concealed in the "ſtructure of the heart itſelf." Three years after this he remarked, in the fourth volume of thoſe Commentaries, that every animal fibre contracts when irritated; that this diſtinguiſhes it from the vegetable fibre; and that the perpetuity of this irritation is the only cauſe of the continuance of motion in the vital organs, as in the heart for inſtance, while the voluntary muſcles ceaſe to act when this irritation is diſcontinued. In the firſt edition of his *Firſt Lines of Phyſiology*, he attributes the motion of the heart to the power of the ſtimulus; and, in the ſecond edition of that work, we find him aſcertaining more fully this irritability of the muſcular fibre, and conſidering it as independent of the nerves, and of every known property. In a word, he ſuppoſes a *vis inſita*, or power inherent in the muſcles, which diſpoſes them to contract, when ſtimulated, independent of the will. As this matter, however, is purely phyſiological, we ſhall content ourſelves, in this place, with relating ſome of the phenomena of irritability, without attempting to inveſtigate its cauſes.

We may obſerve, therefore, 1. That muſcular fibres, when pricked or irritated, immediately contract, after which they return to a ſtate of relaxation. 2. That, in the generality of muſcles, this irritability is ſo great, that, after a ſingle irritation, their fibres contract and relax alternately ſeveral times, the ſtrength of their contractions gradually diminiſhing, till at length the muſcle is at reſt again. 3. That if a nerve, leading to a muſcle, be irritated, the muſcle contracts, but the nerve itſelf is not affected. 4. That irritability does not ſeem to be in proportion to ſenſibility; for the inteſtines, though ſeemingly leſs ſenſible, are more irritable than the ſtomach, and the heart, though exceſſively irritable, ſeems to be endued with little ſenſibility *. 5. That this principle continues in different muſcular parts of the ſame animal, a longer or ſhorter

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* Haller. Diſſertat. ſur l'Irritabilité.

time after death: thus the heart, the diaphragm, and the inteſtines, uſually preſerve this power the longeſt, and are capable of having it excited in them by irritation, when all the other parts of the body are no longer ſuſceptible of it. Lord Bacon [*] tells us, that "having been preſent at the embowelling of a criminal, he ſaw the heart, "after it was thrown into the fire, leap up "for ſeveral times together, at firſt to the "height of a foot and a half, and then gradually lower, to the beſt of his memory, "for the ſpace of ſeven or eight minutes." In a dog, I have ſeen the ſtomach contract upon being irritated, upwards of forty minutes after the action of the heart had ceaſed. In ſome animals [†] the heart continues to contract ſeveral hours after it is ſeparated from the body. 6. That irritability is found to be greater in young than in old, and in ſmall than in large animals.

From what we have ſaid of this property of the muſcular fibre, the reader will perceive,

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[*] Hiſt. de Vitâ et Morte.

[†] Haller. Element. Phyſiolog. tom. ii. 8vo.

ceive, that, beſides the muſcles, properly ſo called, and which are more particularly the object of the preſent part of the work, there are other parts of the body, as the ſtomach, inteſtines, urinary bladder, &c. which owe their power of contracting to what is called their *muſcular tunic*, or *coat*. Irritability is therefore to be conſidered as the characteriſtic of muſcular fibres, and it is by means of this property that we are enabled to aſcertain their exiſtence, even when they are too minute to be obſerved by the naked eye.

Of the Tendons.

THE fibres of the tendons, like thoſe of the belly of a muſcle, are long, ſtraight, and cylindrical; diſpoſed in parallel bundles; ſurrounded by cellular membrane; and, when viewed through a microſcope, appear to be in plaits or folds. But they differ from the fleſhy fibres, in being of a firmer texture, and of a white gliſtening colour; and ſtill more eſſentially, in their being inſenſible and without irritability.

The ancients had a very erroneous idea of their ſtructure. Thus it was the opinion of Galen, that the head of a muſcle was of a ligamentous nature; and the tail, analagous to the ſubſtance of the nerves. The whiteneſs of the tendons led them to conclude, that they had no blood-veſſels; but we now know, that they have both arteries and veins, though in much leſs proportion than the fleſhy fibres. The number of veſſels, however, that penetrate into their ſubſtance, ſeems to be very ſmall, when compared with thoſe which ramify on their ſurface.—Their lymphatics are doubtleſs proportioned to their cellular texture. Anatomiſts, as yet, have not been able to trace the nerves into the ſubſtance of the tendons.

It has long been a matter of diſpute, whether the tendinous fibres are to be conſidered as continuations of the fleſhy fibres, or as diſtinct ſubſtances, cemented to theſe by a glutinous ſubſtance, or by cellular membrane. That they are eſſentially different in their properties from the fleſhy fibres, is evident from the circumſtances I juſt now mentioned; ſuch as their whiteneſs, firmneſs, and want of ſenſibility and irritability; and likewiſe from their having ſo little of an elaſtic property, that they ſtretch but very little before they break, whereas juſt the contrary of this happens to the fleſhy fibres. It is obſervable alſo, that the tendons ſometimes degenerate into a cartilaginous, and even bony ſubſtance, which does not happen to the fleſhy fibres. We may therefore, perhaps, very properly conſider them as cords, interpoſed between the fleſhy fibres and the bone.

Of the Tendinous Faſciæ.

IN our deſcription of the bones, we had frequent occaſion to ſpeak of the grooves which ſerve for the lodgment of tendons; and in ſome of them, we ſaw the tendons ſliding upon a thin layer of cartilage. We find them ſecured in theſe grooves by a ſtrong tendinous *theca*, (ſheath,) or *faſcia*, as it is differently called. We likewiſe obſerve ſuch a faſcia wherever a tendon is inſerted in a different direction from the body of the muſcle. This theca, or ſheath, is ſmooth and moiſt; and where a tendon is expoſed to conſiderable preſſure or friction, we uſually find a ſmall mucous ſac, or *burſa mucoſa*, contained within the ſheath, which, by being thus interpoſed between the tendon and the bone, prevents the inconveniences of friction. Theſe *burſæ mucoſæ* ſometimes inflame, or become otherwiſe diſeaſed, and occaſion a variety of diſtreſſing ſymptoms; ſo that a knowledge of their ſituation is of great uſe in ſurgery: we ſhall, therefore, be careful to point out the principal ones, in our deſcription of particular muſcles.

Many of the long muſcles are likewiſe ſurrounded by a faſcia, or ſheath, of the ſame kind. The chief uſe of theſe ſheaths to the muſcles ſeems to be, to ſtrengthen their action, by keeping them firm in their proper places. But, beſides thoſe which belong to particular muſcles, we find other more general expanſions of the ſame kind, ſpread over a great number of muſcles, affording origin to many of their fibres, dipping down between them, ſeparating them from each other, and, by adhering to the adjacent bone, preventing their ſwelling too much outwardly when in action. Of this kind is the membrane that is ſpread over the muſcles of the arm, and likewiſe that other which covers the muſcles of the thigh, which is commonly called the *faſcia lata*. We ſhall have occaſion to ſpeak more particularly of theſe hereafter.

Of the motions performed by the Muſcles, and of the phænomena of Muſcular Motion.

THE motions performed by the muſcles are of three kinds, viz. *voluntary*, *involuntary*, and *mixed*. The *voluntary* motions are thoſe which are dependent on the will, and the parts by which they are executed are therefore called voluntary muſcles. The *involuntary* motions are thoſe which are not dependent on the will. Of theſe we have inſtances in the heart and arteries, and in the ſtomach and inteſtines. Laſtly, the muſcles of reſpiration are ſaid to have a *mixed* motion, being, in ſome meaſure, influenced by the will.

It is the action of the voluntary muſcles which is called muſcular motion. We ſhall content ourſelves with enumerating ſome of its phenomena, without attempting to inveſtigate its cauſes.

We have already had occaſion to ſpeak of the irritability of the muſcular fibre, which enables it to contract and ſhorten itſelf when pricked or irritated. The ſame effect takes place in obedience to the will; but how the will operates in this caſe we cannot pretend to ſay. In order to illuſtrate this action the more clearly, it will be neceſſary to take a muſcle or two as examples.

In the oſteological part of this work, the generality of the bones were deſcribed as being articulated to each other with ſo much art, as to be capable of motion every way. But their motions cannot be performed by themſelves, as they are perfectly paſſive in all the movements of the body. The muſcles are therefore a kind of cords, attached to the bones, which they move in different directions by ſhortening their fibres. Every one is acquainted with the motion of the lower jaw. We are able firſt to lower it, and then to raiſe and apply it ſtrongly againſt the upper jaw. The action of the maſſeter muſcle, in this caſe, is very ſenſible.—Above, it is fixed to the os malæ, and part of the upper jaw; and below, it is attached to the lower and outer ridge of the under jaw. When we are willing, therefore, to raiſe the jaw, its muſcles are put into action. The maſſeter, on each ſide, contracts; and its fleſhy part ſwells and enlarges, and becomes harder and ſhorter; and, as the upper end of this muſcle is attached to a fixed and immoveable part, which is the caſe with the maxilla ſuperior, the lower extremity is neceſſarily drawn towards the upper one, bringing with it the lower jaw. This muſcle, when in action, may be eaſily felt, by applying the hand to the cheek, between the cheek bone and the lower jaw.

Again, when we deſire to bend the fingers, the flexor muſcles, which are attached to the os humeri and the bones of the fore-arm, and have their tendons fixed to the inner ſurface of the extremities of the fingers, contract and ſhorten themſelves; and thus the ends of the fingers are drawn towards the palm of the hand.

The reader will here naturally enquire, by what mechaniſm this power to contract is occaſioned.

Many opinions have been formed, and much has been written on this ſubject. They who ſuppoſe the muſcular fibres to conſiſt of minute veſicles, are of opinion that the nerves, which are diſtributed through the muſcle, bring with them a ſupply of animal ſpirits, which, at our will, fill theſe bladders, and, by increaſing their diameter in width, ſhorten them, and, of courſe, the whole fibre. We will dwell no longer, however, on this hypotheſis, nor will we ſay any thing of other ſyſtems, which, like that we have mentioned, are ſounded only on conjecture, and therefore are far from being ſatisfactory.

Some few things we know with certainty on this ſubject, and theſe are, 1. That the nerves are eſſentially neceſſary to muſcular motion; for, if we tie up or divide the nerves leading to any muſcle, that muſcle becomes paralytic and incapable of action. 2. That the cauſe of palſy is uſually not ſeated in the part affected, but commonly in the nerve leading to that part, or perhaps in the brain, or ſpinal marrow, from whence the nerves originate. 3. That a ligature, made on the artery leading to a muſcle, produces the ſame effects as a ligature on the nerve, by rendering it inactive, and even inſenſible. This laſt obſervation proves, that a regular ſupply of blood, though not the cauſe of muſcular motion, is, at leaſt, eſſentially neceſſary to it.

Of the names of the Muſcles.

THE word *muſcle* is, by ſome writers, derived from μῦς, a name ſaid to have been firſt adopted by Pollux, on account of the ſuppoſed reſemblance of a muſcle to a mouſe when ſtript of its ſkin; but others, with more reaſon, derive it from μυεῖν, *contrahere*, which is the proper action of a muſcle.

Galen, and others of the ancients, were acquainted with the greater part of the muſcles; but, as they diſtinguiſhed only a few of them by particular appellations, their deſcriptions are often times obſcure and difficult to be underſtood. Veſalius has, in general, contented himſelf with deſcribing them numerically. Bauhin, Riolanus, and Spigelius, ſeem to have been ſome of the firſt anatomiſts who gave to each muſcle a particular name. Several other later writers have employed themſelves in this way.

The Nomenclature of Douglas having been of late years moſt commonly adopted in this country, I ſhall make him my principal guide in this reſpect; and where I deviate from him, it will generally be to follow Albinus. I ſhall be careful, however, to point out theſe variations to the reader, and at the ſame time to give the ſynonyma of Winſlow, and ſometimes of other writers.

The names by which the muſcles are diſtinguiſhed, are founded on their ſituation or ſtructure, on the direction of their fibres, on their origin and inſertion, or on their ſhape, ſize, uſes, &c. Thus the *pectoralis*, the *intercoſtales*, &c. have gotten their names from their ſituation; and the *ſemitendinoſus*, the *ſemimembranoſus*, &c. from their ſtructure; the *recti*, the *obliqui*, the *tranſverſales*, &c. from the direction of their fibres; the *ſtylo-hyoideus*, the *coraco-hyoideus*, &c. from their origin and inſertion; the *zygomaticus*, the *pterygoideus*, &c. from their origin, and the *ſpinalis* and *ſemi-ſpinalis* from their inſertion alone; the *deltoides*, the *trapezius*, the *rhomboides*, &c. from their ſhape; and the *flexors*, *extenſors*, *adductors*, *abductors*, &c. from their uſes.—Theſe, and other diſtinctions, will be more fully explained in our deſcription of particular muſcles.

Of the Arrangement of the Muſcles.

THE generality of anatomical writers have arranged the muſcles according to their ſeveral uſes. But this method is evidently defective, as the ſame muſcles may very often have different uſes; and it cannot fail to embarraſs the ſtudent; who, inſtead of ſeeing them follow each other in a natural ſeries, and thus acquiring a clear idea of their ſituation, often finds muſcles claſſed together that are placed at a diſtance from each other. I have therefore thought it better to purſue the method adopted by the celebrated Albinus, in his excellent Hiſtory of the Muſcles, by deſcribing them in the order in which they are ſituated, beginning with thoſe that are placed neareſt the integuments, and proceeding from theſe to the muſcles that are more deeply ſeated.

In the following chapter, however, the reader muſt not expect to find an account of all the muſcles. There are ſome, the deſcription of which I ſhall defer till we come to treat of the parts to which they belong; of this number are the muſcles of the eyes and eye-lids, the ears, the noſe, the lips, the tongue, the velum palati, the larynx, the pharynx, the inteſtinum rectum, and the male and female organs of generation. By this means we ſhall avoid repetition, and be enabled to convey a more accurate idea of the ſtructure of all theſe ſeveral parts.

THE reader will be pleaſed to obſerve likewiſe, that, in general, mention is made only of the muſcles of one ſide, becauſe all the muſcles of the body, a very few only excepted, have correſpondent ones on the oppoſite ſide.

CHAP. II.

Of the particular Muſcles.

SECTION I.

Of the Muſcles ſituated on the anterior part of the Abdomen.

IN diſſecting a ſubject for the muſcles, it is uſual to begin with thoſe of the lower belly. Theſe are ten in number, five on each ſide; viz. the *obliquus externus*, *obliquus internus*, *tranſverſalis*, *rectus*, and *pyramidalis.* The three firſt form ſo many broad layers on each ſide of the belly, filling up the ſpace between the cartilaginous edges of the falſe ribs, and the bones of the pelvis. They are fleſhy poſteriorly, and tendinous at their fore part, where they unite with thoſe of the oppoſite ſide; and the interlacement of their tendinous fibres forms what is called the *linea alba*, which extends from the cartilago xiphoides to the os pubis, and is perforated in the middle by the umbilicus. This linea alba has induced Columbus *, and ſome other anatomiſts, to conſider them as three digaſtric muſcles, compoſed of a broad middle tendon and two fleſhy bellies.—The two laſt, viz. the rectus and pyramidalis, are ſituated at the ſide of the linea alba; the former is a long, and the latter a ſhort muſcle.

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* De Re Anatomica, lib. v.

Obliquus Externus.

THIS muſcle, which is ſo named by Morgagni, Albinus, and Winſlow, is the *obliquus deſcendens* of Veſalius and Douglas, and the *obliquus major* of Haller and ſome others. It is a broad, thin muſcle, fleſhy poſteriorly, and tendinous in its middle and lower part, and is ſituated immediately under the integuments, covering all the other muſcles of the lower belly.

It ariſes from the lower edges of the eight, and ſometimes, though rarely, of the nine inferior ribs, not far from their cartilages, by as many diſtinct fleſhy portions, which indigitate with correſponding parts of the ſerratus major anticus, and the latiſſimus dorſi. From theſe ſeveral origins, the fibres of the muſcle deſcend obliquely forwards, and ſoon degenerate into a broad and thin aponeuroſis, which terminates in the linea alba.

About an inch and a half above the pubis the fibres of this aponeuroſis ſeparate from each other, ſo as to form an aperture, which extends obliquely inwards and forwards, more than an inch in length, and is wider above than below, being nearly of an oval figure. This is what is ſometimes, though erroneouſly, called the *ring* of the abdominal muſcles, for it belongs only to the external oblique, there being no ſuch opening either in the obliquus internus or in the tranſverſalis, as ſome writers, and particularly Douglas and Cheſelden, would give us to underſtand. This opening, or ring, ſerves for the paſſage of the ſpermatic veſſels in men, and of the round ligament of the uterus in women, and is of a larger ſize in the former than in the latter.

The two tendinous portions, which, by their ſeparation, form this aperture, are called the *columns* of the ring. The anterior, ſuperior, and inner column, which is the broadeſt and thickeſt of the two, paſſes over the ſymphyſis pubis, and is fixed to the oppoſite os pubis; ſo that the anterior column of the right obliquus externus interſects that of the left, and is, as it were, interwoven with it, by which means their inſertion is ſtrengthened, and their attachment made firmer.—The poſterior, inferior, and exterior column, approaches the anterior one as it deſcends, and is fixed behind and below it to the os pubis of the ſame ſide.

The fibres of that part of the obliquus externus, which ariſes from the two inferior ribs, deſcend almoſt perpendicularly, and are inſerted, tendinous and fleſhy, into the outer edge of the anterior half of the ſpine of the ilium. From the anterior ſuperior ſpinous proceſs of that bone, the external oblique is ſtretched tendinous to the os pubis, forming what is called *Poupart's* *, and ſometimes *Fallopius's* ligament, Fallopius † having firſt deſcribed it. Winſlow, and many others, name it the *inguinal* ligament. But, after all, it has no claim to this name, it being nothing more than the tendon of the muſcle, which is turned or folded inwards at its interior edge. It paſſes over the blood-veſſels of the lower extremity, and is thickeſt near the pelvis; and in women, from the greater ſize of the pelvis, it is longer and looſer than in men. Hence we find, that women are moſt liable to crural herniæ; whereas men, from the greater ſize of the ring of the external oblique, are moſt ſubject to the inguinal. From this ligament, and from that part of the tendon which forms the ring, we obſerve a detachment of tendinous fibres, which are loſt in the *faſcia lata* of the thigh. This may, in ſome meaſure, account for the pain which, in caſes of ſtrangulated herniæ, is felt when the patient ſtands upright, and which is conſtantly relieved upon bending the thigh upwards.

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* Hiſtoire de l'Acad. des Sciences, 1705.

† Obſerv. Anatom.

THIS muſcle ſerves to draw down the ribs in expiration; to bend the trunk forwards when both muſcles act, or to bend it obliquely to one ſide, and, perhaps, to turn it ſlightly upon its axis, when it acts ſingly; it alſo raiſes the pelvis obliquely when the ribs are fixed; it ſupports and compreſſes the abdominal viſcera, aſſiſts in the evacuation of the urine and fæces, and is likewiſe uſeful in parturition.

Obliquus Internus.

THIS muſcle, which is the *obliquus aſcendens* of Veſalius and Douglas, and the *obliquus minor* of Haller, is ſituated immediately under the external oblique, and is broad and thin like that muſcle, but ſomewhat leſs conſiderable in its extent.

It ariſes from the ſpinous proceſſes of the three inferior lumbar vertebræ, and from the poſterior and middle part of the os ſacrum, by a thin tendinous expanſion, which is common to it and to the ſerratus poſticus inferior; by ſhort tendinous fibres, from the whole ſpine of the ilium, between its poſterior tuberoſity, and its anterior and ſuperior ſpinous proceſs; and from two-thirds of the poſterior ſurface of what is called Fallopius's ligament, at the middle of which we find the round ligament of the uterus in women, and the ſpermatic veſſels in men, paſſing under the thin edge of this muſcle; and in the latter, it likewiſe ſends off ſome fibres, which deſcend upon the ſpermatic chord, as far as the tunica vaginalis of the teſtis, and conſtitute what is called the *cremaſter* muſcle. We ſhall have occaſion to ſpeak more particularly of this muſcle in our deſcription of the teſticle.

From theſe origins, the fibres of the internal oblique run in different directions; thoſe of the poſterior portion aſcend obliquely forwards, the middle ones become leſs and leſs oblique, and, at length, run in an horizontal direction, and thoſe of the anterior portion extend obliquely downwards. The firſt of theſe are inſerted, by very ſhort tendinous fibres, into the cartilages of the fifth, fourth, and third of the falſe ribs; the fibres of the ſecond, or middle portion, form a broad tendon, which, after being inſerted into the lower edge of the cartilage of the ſecond falſe rib, extends towards the linea alba, and ſeparates into two layers; the anterior layer, which is the thickeſt of the two, joins the tendon of the obliquus externus, and runs over the two upper thirds of the rectus muſcle, to be inſerted into the linea alba; the poſterior layer runs under the rectus, adheres to the anterior ſurface of the tendon of the tranſverſalis, and is inſerted into the cartilages of the firſt of the falſe, and the laſt of the true ribs, and likewiſe into the linea alba. By this ſtructure we may perceive that the greater part of the rectus is incloſed, as it were, in a ſheath.

The fibres of the anterior portion of the internal oblique, or thoſe which ariſe from the ſpine of the ilium and the ligamentum Fallopii, likewiſe form a broad tendon, which, inſtead of ſeparating into two layers like that of the other part of the muſcle, runs over the lower part of the rectus, and, adhering to the under ſurface of the tendon of the external oblique, is inſerted into the fore part of the pubis.

This muſcle ſerves to aſſiſt the obliquus externus; but it ſeems to be more evidently calculated than that muſcle is, to draw the ribs downwards and backwards. It likewiſe ſerves to ſeparate the falſe ribs from the true ribs, and from each other.

Tranſverſalis.

THE name of this muſcle has never varied ſince the time of Veſalius, who firſt called it *tranſverſalis*, on account of the direction of its fibres. It is nearly of the ſame ſhape and extent as the obliquus internus, and is ſituated between that muſcle and the peritonæum.

It ariſes fleſhy from the two anterior thirds of the ſpine of the ilium, and from the inner ſurface of the upper half of the ligamentum Fallopii; by a broad thin tendon, from the tranſverſe proceſſes of the three or four ſuperior lumbar vertebræ, and of the laſt dorſal vertebra; and from the inner or back part of the cartilages of the ſix or ſeven inferior ribs, by as many tendinous portions, which ſoon become fleſhy, if we except the laſt, which forms a thin broad tendon of an inch in length. At theſe origins from the ribs, we find ſome of the fibres of the tranſverſalis intermixed with thoſe of the diaphragm, and ſometimes with thoſe of the intercoſtals.

As the fibres of this muſcle approach the rectus, they become tendinous; but the middle fibres do this ſooner than the upper or lower ones, ſo as to form a kind of creſcent. The three upper quarters of this aponeuroſis paſs under the poſterior layer of the obliquus internus, to which it adheres, and is inſerted wholly into the linea alba, except a very ſmall portion of it, which we find terminating on the anterior ſurface of the cartilago enſiformis. The lower quarter of the tendon paſſes over the rectus muſcle, and, adhering to the anterior layer of the obliquus internus, is inſerted into the upper and anterior part of the pubis. From this ſtructure we may perceive, that the lower part of the rectus is immediately contiguous to the peritonæum. This circumſtance has been conſidered as a late diſcovery, but it was evidently known to Galen.

Although the greater part of the fibres of this muſcle run in a tranſverſe direction, yet ſome few of its upper fibres extend ſomewhat obliquely upwards, as ſome of its lower ones do a little obliquely downwards.

The uſe of this muſcle is to ſupport and compreſs the abdominal viſcera.

Rectus Abdominis.

THIS long and ſtrait muſcle is ſituated near its fellow, at the middle and fore part of the abdomen, parallel to the linea alba, and between the aponeuroſes of the three laſt deſcribed muſcles, in the manner we have already related.

It ariſes ſometimes by a ſingle broad tendon from the upper and inner part of the os pubis, but more commonly by two heads, one of which is fleſhy, and originates from the upper edge of the pubis, and the other tendinous, from the inſide of the ſymphyſis pubis, behind the pyramidalis muſcle. From theſe beginnings, the muſcle runs upwards the whole length of the linea alba, and, becoming broader and thinner as it aſcends, is inſerted by a thin aponeuroſis into the edge of the cartilago enſiformis, and into the cartilages of the fifth, ſixth, and ſeventh ribs.—This aponeuroſis is placed under the pectoral muſcle, and ſometimes adheres to the fourth rib.

The fibres of this muſcle are commonly divided by three tendinous interſections, which were firſt noticed by Berenger, or, as he is commonly called, Carpi, an Italian anatomiſt, who flouriſhed in the ſixteenth century. One of theſe interſections is uſually where the muſcle runs over the cartilage of the ſeventh rib; another is at the umbilicus; and the third is between theſe two. Sometimes there is one, and even two, between the umbilicus and the pubis. When one, or both of theſe occur, however, they ſeldom extend more than half way acroſs the muſcle. As theſe interſections ſeldom penetrate through the whole ſubſtance of the muſcle, they are all of them moſt apparent on its anterior ſurface, where they firmly adhere to the ſheath; the adheſions of the rectus to the poſterior layer of the internal oblique, are only by means of cellular membrane, and of a few veſſels which paſs from one to the other.

Albinus and ſome others have ſeen this muſcle extending as far as the upper part of the ſternum.

The uſe of the rectus is to compreſs the fore part of the abdomen, but more particularly the lower part; and, according to the different poſitions of the body, it may likewiſe ſerve to bend the trunk forwards, or to raiſe the pelvis. Its ſituation between the two layers of the internal oblique, and its adheſions to this ſheath, ſecure it in its place, and prevent it from riſing into a prominent form when in action; and laſtly, its tendinous interſections enable it to contract at any of the intermediate ſpaces.

Pyramidalis.

FALLOPIUS, who is conſidered as the firſt accurate deſcriber of this muſcle, firſt gave it the name of *pyramidalis*, from its ſhape. But Veſalius ſeems to have been acquainted with it, and to have deſcribed it as a part of the rectus. It is a very ſmall muſcle, ſituated at the bottom of the fore part of the rectus, and is covered by the ſame aponeuroſis that forms the anterior part of the ſheath of that muſcle.

It ariſes, by ſhort tendinous fibres, from the upper and fore part of the pubis. From this origin, which is ſeldom more than an inch in breadth, its fibres aſcend ſomewhat obliquely, to be inſerted into the linea alba and inner edge of the rectus, commonly at about the diſtance of two inches from the pubis, and frequently at a greater or leſs diſtance, but always below the umbilicus.

In ſome ſubjects the pyramidalis is wanting on one or both ſides, and when this happens, the internal oblique is uſually found to be of greater thickneſs at its lower part. Now and then, though rarely, there are two at one ſide, and only one at the other, and M. Sabatier [*] has even ſeen two on each ſide.

Fallopius and many others after him have conſidered it as the congener of the internal oblique; but its uſe ſeems to be to aſſiſt the lower part of the rectus.

SECTION II.

Of the Muſcles ſituated on the anterior part of the Thorax.

Pectoralis.

THIS is a broad, thick, fleſhy, and radiated muſcle, ſituated immediately under the integuments, and covering almoſt the whole anterior part of the breaſt. Winſlow calls it *pectoralis major*, to diſtinguiſh it from the ſerratus anticus, which he has named *pectoralis minor*.

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[*] Traité d'Anatomie, tom. i.

It ariſes from the cartilaginous extremities of the fifth and ſixth ribs, from the laſt of which its tendinous fibres deſcend over the upper part of the obliquus externus and rectus abdominis, helping to form a part of the ſheath in which the latter is included. It likewiſe ſprings from almoſt the whole length of the ſternum by ſhort tendinous fibres, which evidently decuſſate thoſe on the other ſide; and tendinous and fleſhy from more than a third of the anterior part of the clavicle.

From theſe origins the fibres run in a folding manner towards the axilla, and are inſerted by a broad tendon into the os humeri, above the inſertion of the deltoid muſcle, and at the outer ſide of the groove which lodges the tendon of the long head of the biceps: ſome of its fibres likewiſe extend into that groove; and, from the lower part of this tendon, which is ſpread near two inches along the os humeri, we find it ſending off other fibres, which help to form the faſcia that covers the muſcles of the arm.

It often happens, that that part of the pectoralis which ariſes from the clavicle, is ſeparated from the inferior portion, ſo as to appear like a diſtinct muſcle. This has induced Winſlow to divide it into parts, one of which he calls the *clavicular*, and the other the *thoracic* portion. Sometimes theſe two portions are inſerted by ſeparate tendons, which croſs one another at the upper and inner part of the os humeri, the tendon of the thoracic portion being inſerted at the outer edge of the bicipital groove, immediately behind the other.

This muſcle, and the latiſſimus dorſi, form the cavity of the axilla, or arm-pit.

The uſe of the pectoralis is to move the arm forwards, or to raiſe it obliquely towards the ſternum. It likewiſe occaſionally aſſiſts in moving the trunk upon the arm; thus, when we exert any efforts with the hand, as in raiſing ourſelves from off an arm-chair, or in ſealing a letter, the contraction of this muſcle is particularly obſervable.

To theſe uſes, Haller[*] adds that of its aſſiſting in reſpiration, by raiſing the ſternum and ribs. He tells us he well remembers, that when this muſcle was affected by rheumatiſm, his breathing was incommoded; and that, when troubled with difficulty of reſpiration, he has often found himſelf greatly relieved by raiſing and drawing back his ſhoulders, keeping his arms at the ſame time firmly fixed. Winſlow[†], however, has denied this uſe, and Albinus has omitted it, probably becauſe it does not take place in a natural ſtate.

Subclavius.

THIS ſmall muſcle is ſituated between the clavicle and the firſt rib, immediately under the upper part of the pectoralis.

It ariſes by a tendon, near an inch long, from the upper ſurface of the cartilage of the firſt rib, and then becoming fleſhy, is inſerted into the under ſurface of the clavicle, from within about an inch of the ſternum to the ligament that connects the clavicle with the coracoid proceſs of the ſcapula.

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[*] Element. Phyſiol. tom. iii.

[†] Mem. de l'Acad. des Sciences, 1738.

The principal uſe of this muſcle ſeems to be to draw the clavicle downwards and forwards.—It may likewiſe, in a ſlight degree, ſerve to elevate the firſt rib: this was the opinion of the ancients, and has been adopted by Douglas, Albinus, and Haller; but Spigelius, Winſlow, and others, contend that it can be of no uſe in reſpiration.

Serratus Anticus.

DOUGLAS calls this muſcle *ſerratus minor anticus*, and Winſlow gives it the name of *pectoralis minor*. It is a fleſhy and pretty conſiderable muſcle, ſituated at the anterior and lateral part of the thorax, immediately under the pectoralis.

It ariſes from the upper edges of the third, fourth, and fifth ribs, near where they join with their cartilages, by an equal number of tendinous and fleſhy digitations, which have been compared to the teeth of a ſaw *(ſerra,)* whence this, and ſome other muſcles, from their having a ſimilar origin or inſertion, have gotten the name of *ſerrati.* From theſe origins it becomes thicker and narrower as it aſcends, and is inſerted by a flat tendon into the upper part of the coracoid proceſs of the ſcapula.

The principal uſe of this muſcle is to draw the ſcapula forwards and downwards; and when that is fixed, it may likewiſe ſerve to elevate the ribs.

Serratus Magnus.

THIS muſcle is ſo named by Winſlow and Albinus. Douglas calls it *ſerratus major anticus*, but improperly, as it is ſeated at the ſide, and not at the anterior part, of the thorax. It is a broad, fleſhy muſcle, of a very irregular ſhape, and is in part covered by the ſubſcapularis, pectoralis, and latiſſimus dorſi.

It ariſes, by fleſhy digitations, from the eight ſuperior ribs, and is inſerted fleſhy into the whole baſis of the ſcapula internally, between the inſertion of the rhomboides, and the origin of the ſubſcapularis, being folded, as it were, about the two angles of the ſcapula.

This muſcle may eaſily be divided into two and even three portions. The latter diviſion has been adopted by Winſlow. The firſt of theſe portions is the thick and ſhort part of the muſcle that ariſes from the firſt and ſecond ribs, and is inſerted into the upper angle of the ſcapula, its fibres aſcending obliquely backwards. The ſecond portion ariſes from the ſecond rib, behind the origin of the firſt portion, and likewiſe from the third and fourth ribs: this portion is thin and ſhort, and its fibres run nearly in a horizontal direction, to be inſerted into the baſis of the ſcapula. The third and moſt conſiderable portion is that which ariſes from the fifth, ſixth, ſeventh, and eighth ribs, and is inſerted into the lower angle of the ſcapula.

The ſerratus magnus ſerves to move the ſcapula forwards, and it is chiefly by the contraction of this muſcle that the ſhoulder is ſupported, when loaded with any heavy weight.—The ancients, and even many of the moderns, particularly Douglas and Cowper, ſuppoſed its chief uſe to be to dilate the thorax, by elevating the ribs; but it can only do this when the ſcapula is forcibly raiſed.

SECTION III.

Of the Muſcles that aſſiſt in forming the cavity of the Thorax.

Diaphragma.

THE diaphragm*, or *midriff*, is a broad and very conſiderable muſcle, which is ſituated obliquely between the upper part of the abdomen and the lower part of the thorax, ſo as to form a complete ſeptum between theſe two cavities. It ſeems to have been improperly named *ſeptum tranſverſum*, as it does not make a plane, tranſverſe diviſion of the two cavities, but forms a kind of vault, the fore part of which is attached to the ſternum.

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* Διαφράγμα, interſeptum.

From its being tendinous in its centre, the generality of modern anatomiſts have been led to deſcribe it as two muſcles, but this diviſion is altogether arbitrary.

Its upper, anterior, and moſt conſiderable portion, which has been called the *greater muſcle of the diaphragm*, ariſes fleſhy from the cartilago enſiformis, and by fleſhy digitations, which intermix with the fibres of the tranſverſalis abdominis, from the lower edges of the cartilages of the ſeventh, eighth, and ninth ribs, from the bony part of the tenth and eleventh, and from the extremity of the twelfth.

From theſe ſeveral origins, the fibres of the muſcle converge towards a broad tendon, which is ſituated in the middle of the diaphragm; the fibres from the cartilago enſiformis running ſtraight backwards, thoſe from the ſeventh and eighth ribs obliquely backward, from the ninth and tenth tranſverſely inwards, and thoſe from the two laſt ribs obliquely upwards. This middle tendon is of an irregular ſhape. It has been compared to a heart, as it is pictured upon cards, with its apex turned upwards, and likewiſe tô a trefoil leaf, with its pedicle widely expanded. Neither of theſe compariſons, however, can convey any clear idea of its real ſtructure and appearance. The reader will find it accurately delineated in the firſt faſciculus of Haller's *Icones Anatomicæ.* In this tendinous expanſion the fibres are variouſly interlaced; the greater part of them run in the ſame courſe as the fleſhy fibres; but many of the faſciculi croſs the others in various directions. Theſe different faſciculi are beſt ſeen in old ſubjects.

The two ſides or alæ of this tendon meet ſo as to form an obtuſe point near the ſternum; and of its two alæ, the left deſcends the loweſt. Towards the right ſide the tendon is perforated, for the paſſage of the vena cava. The ſhape of this opening varies in different ſubjects; hence we find ſome authors deſcribing it as oval, and others as triangular, and even quadrangular. The truth is, that, in general, the ſide next the ribs forms the half of a regular oval; that end of it which is fartheſt from the ſternum is pointed, and the other ſide of, it juts out into a point, ſo as to give it the appearance of an irregular triangle.

As the circumference of this opening is every where tendinous, Winſlow and others have ſuppoſed that the vein paſſes through it ſecure from preſſure. But the experiments made by Haller [*] on living animals, clearly prove that when the diaphragm deſcends, the vein is drawn with it, and is compreſſed, ſo as to occaſion, at each inſpiration, a regurgitation of the blood in that part of it which is below the muſcle.

The diameter of this foramen being larger than that of the vena cava, the pleura and peritonæum are found in contact with each other between the vein and the ſides of the foramen. This obſervation was firſt made by the celebrated Morgagni [†]. At the ſide of this hole, it is not unuſual to find one or two little foramina, which tranſmit the phrenic, and ſometimes the hepatic veins.

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[*] *De Reſpiratione*, Exp. 49. 53. 57. 59. 61, 62. Opera Minor. tom. i.

[†] Epiſtol. Anatom. i.

THE inferior and poſterior portion or appendix of the diaphragm, which has been called the *leſſer muſcle*, is ſituated upon the bodies of the vertebræ; and its fibres being more collected, give it greater thickneſs than the upper portion. It ariſes from the ſides and fore part of the ſecond, third, and fourth of the lumbar vertebræ, by eight heads. The two in the middle, which begin tendinous, and are the longeſt, are uſually called the *crura* of the diaphragm. The right crus is larger, and ſituated ſomewhat more anteriorly than the left. Between theſe crura we find an opening, which is narrower above than below, and ſurrounded by tendinous fibres. This ſerves for the paſſage of the aorta and thoracic duct; and on the outſide of theſe, the ſhorter heads are perforated by two branches of the intercoſtal nerve, and by the vena azygos. Higher up, and more anteriorly, the fibres of the muſcle decuſſate, and leave a large oval ſpace, the circumference of which is almoſt entirely fleſhy, and of courſe contracts at each inſpiration. Through this hole paſs the œſophagus, and the eighth pair of nerves.—The whole of this inferior portion is inſerted by ſtrong fleſhy fibres into the poſterior part of the middle tendon, towards which the greater part of them run with greater or leſs obliquity upwards.

The diaphragm is covered by the pleura above, and by the peritonæum below; except where the pericardium and mediaſtinum, on the ſide of the thorax, and part of the convex ſurface of the liver, on the ſide next the abdomen, adhere to its middle tendon.

The principal arteries of the diaphragm are the phrenic, which are ſometimes derived, in a ſingle branch, from the aorta, and ſometimes, in ſeveral branches, from the aorta, the cœliac, and now and then from the emulgent; beſides theſe, it receives other ſmaller branches from the inferior intercoſtals, the internal mammary, and ſuperior lumbar arteries, as well as from thoſe of the mediaſtinum. Its veins, for the moſt part, paſs into the vena cava. Its nerves are numerous. The moſt conſiderable of theſe, which are called the *phrenic*, are derived from the cervical pairs. It likewiſe receives other branches from the intercoſtal, from the eighth pair, and from the inferior dorſal and ſuperior lumbar pairs.

The diaphragm not only ſerves to divide the thorax from the abdomen, but, by its muſcular ſtructure, is rendered one of the chief agents in reſpiration.

When its fibres contract, as in *inſpiration*, they endeavour to bring themſelves on a plane towards the middle tendon, and thus, by enlarging the cavity of the thorax, afford room for a complete dilatation of the lungs. The middle tendon itſelf likewiſe deſcends in the act of inſpiration, though in a much leſs degree than the fleſhy parts of the muſcle, on account of its attachment to the pericardium. Verheyen was therefore greatly miſtaken, when he aſſerted * that the tendinous part of the diaphragm aſcends, while its fleſhy fibres are deſcending. But ſome of the old writers had ſtill more erroneous notions on this ſubject. They were of opinion that the whole muſcle is immoveable in reſpiration, and that its ſole uſe is to ſeparate the thorax from the abdomen. This doctrine, which ſeems to have been firſt ſtarted by Ariſtotle, is zealouſly aſſerted by Sir George Ent*, in his Animadverſions on Dr. Thruſton, and ſtill more lately by Deidier †.—In *expiration*, the diaphragm is relaxed, and, as it reſumes its former ſtate, the cavity of the thorax becomes gradually diminiſhed, and the air is driven out again from the lungs by a motion contrary to the former one.

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* Corpor. Human. Anatom. lib. i.

The aſcent of this muſcle in expiration is favoured by the contraction of the abdominal muſcles, which is alternate with that of the diaphragm. The gentle preſſure, which all the abdominal viſcera receive from this conſtant and regular motion, cannot fail to aſſiſt in the performance of their ſeveral functions. But there are certain circumſtances, in which the abdominal muſcles and the diaphragm all act at the ſame time, and by this means the cavity of the abdomen is diminiſhed, and its contents more forcibly compreſſed. This is what happens in parturition, in the expulſion of the fæces, and in vomiting. Beſides theſe uſes, we may obſerve, that the acts of coughing, ſneezing, ſpeaking, laughing, gaping, and ſighing, could not take place without the aſſiſtance of the diaphragm; ſo that the variety of its offices, and its ſtructure, make it well deſerving of the epithet the celebrated Haller has beſtowed on it, of *nobiliſſimus, poſt cor, muſculus.*

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* ΑΝΤΙΔΙΑΤΡΙΒΗ, ſive Animadverſiones in M. Thruſtoni M. D. Diatribam, &c. p. 74.

† Anatomie raiſonnée.

Levatores Coſtarum.

THESE muſcles were firſt deſcribed, and ſo named, by Steno [*]. Verheyen, and after him Winſlow, calls them *ſupra coſtales.* Lieutaud includes them in his deſcription of the intercoſtales externi; they have, indeed, nearly the ſame uſes, but it is eaſy to demonſtrate them as diſtinct muſcles. They are very ſmall, and nearly of a triangular ſhape, and are twelve in number on each ſide of the thorax. Their back parts are covered by the ſacro lumbalis and the longiſſimus dorſi.

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[*] De Muſculis et Gland. Obſerv. Specimen.

THEY ariſe tendinous from the lower part of the tranſverſe proceſſes of the laſt vertebra of the neck, and of the eleven ſuperior vertebræ of the back, and, deſcending obliquely forwards and outwards, are inſerted tendinous into the upper ſide of all the ribs*, near their tuberoſities. The ſuperior muſcles are ſmaller, thinner, and ſhorter than the lower ones, and have therefore been called *levatores coſtarum breviores*, to diſtinguiſh them from the three or four inferior ones, which uſually run down to the ſecond rib below the tranſverſe proceſs, before they are inſerted, and, on this account, are called *levatores coſtarum longiores*.

MOST of theſe muſcles ſend off fibres, which intermix with thoſe of the longiſſimus dorſi; and Morgagni † has ſeen them all ſo intimately united with each other, as to appear like one large ſerrated muſcle. Senac has attempted to prove, that they are calculated rather to ſupport and move the vertebræ laterally, than to act upon the ribs; but it ſeems evident that their principal uſe is to pull the ribs upwards and outwards.

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* Douglas excepts the firſt rib.

† Adverſ. Anat. 2. Animad. 15.

Intercoſtales.

BETWEEN the ribs, on each ſide, we find eleven double rows of muſcles. Theſe are the *intercoſtales externi*, and *interni*. Galen has very properly obſerved, that they decuſſate each other like the ſtrokes of the letter X.

THE *intercoſtales externi* ariſe from the lower edge of each ſuperior rib, and, running obliquely downwards and forwards, are inſerted into the upper edge of each inferior rib, ſo as to ocupy the intervals of the ribs, from as far back as the ſpine to their cartilages; but from their cartilages to the ſternum, we find only a thin aponeuroſis covering the internal intercoſtals.

The *intercoſtales interni* ariſe and are inſerted in the ſame manner as the external. They begin at the ſternum, and extend as far as the angles of the ribs, their fibres running obliquely backwards. Theſe fibres are ſpread over a conſiderable part of the inner ſurface of the ribs, ſo as to be longer than thoſe of the external intercoſtals.

Some of the poſterior portions of the internal intercoſtals paſs over one rib, and are inſerted into the rib below. Verheyen firſt deſcribed theſe portions as ſeparate muſcles, under the name of *infra coſtales.* Winſlow has adopted the ſame name. Cowper, and after him Douglas, calls them *coſtarum depreſſores proprii.* Theſe diſtinctions, however, are altogether ſuperfluous, as they are evidently nothing more than appendages of the intercoſtals. The number of theſe portions varies in different ſubjects. Moſt commonly we find only four, the firſt of which runs from the ſecond rib to the fourth, the ſecond from the third rib to the fifth, the third from the fourth rib to the ſixth, and the fourth from the fifth rib to the ſeventh.

The internal intercoſtals of the two inferior falſe ribs are frequently ſo thin, as to be with difficulty ſeparated from the external; and, in ſome ſubjects, one or both of them ſeem to be altogether wanting.

It was the opinion of the ancients, that the external intercoſtals ſerve to elevate, and the internal to depreſs the ribs. They were probably led to this opinion, by obſerving the different direction of their fibres; but it is now well known, that both have the ſame uſe, which is that of raiſing the ribs equally during inſpiration. Fallopius[*] was one of the firſt who ventured to call in queſtion the opinion of Galen on this ſubject, by contending that both layers of the intercoſtals ſerve to elevate the ribs. In this opinion he was followed by Hieronymus Fabricius[†], our countryman Mayow[‡], and Borelli[||]. But, towards the cloſe of the laſt century, Bayle[§], a writer of ſome eminence, and profeſſor at Toulouſe, revived the opinion of the ancients by the following arguments. He obſerved, that the oblique direction of the fibres of the internal intercoſtals is ſuch, that, in each inferior rib, theſe fibres are nearer to the vertebræ than they are at their ſuperior extremities, or in the rib immediately above; and that, of courſe, they muſt ſerve to draw the rib downwards, as towards the moſt fixed point. This plauſible doctrine was adopted by ſeveral eminent writers, and, amongſt others, by Nicholls [*], Hoadley [†], and Schreiber [‡]; but, above all, by Hamberger [||], who went ſo far as to aſſert, that not only the ribs, but even the ſternum, are pulled downwards by theſe muſcles, and conſtructed a particular inſtrument to illuſtrate this doctrine. He pretended, likewiſe, that the intervals of the ribs are increaſed by their elevation, and diminiſhed by their depreſſion; but he allowed, that, while thoſe parts of the internal intercoſtals, that are placed between the bony part of the ribs, pull them downwards, the anterior portions of the muſcle, which are ſituated between the cartilages, concur with the external intercoſtals in raiſing them upwards. Theſe opinions gave riſe to a warm and intereſting controverſy, in which Hamberger and Haller were the principal diſputants. The former argued chiefly from theory, and the latter * from experiments on living animals, which demonſtrate the fallacy of Hamberger's arguments, and prove, beyond a doubt, that the internal intercoſtals perform the ſame functions as the external.

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[*] Obſerv. Anatom. p. 387. [†] De Reſpiratione, p. 71. [‡] Tractat. de Reſpirat. p. 281. [||] De Motu Anim. lib. xi. [§] Differt. Phyſic.

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[*] Compend. Anat. Oecon.

[†] On the Organs of Reſpiration.

[‡] In his edition of Douglas's Myograph. Spec.

[||] De Reſpirat. Mechaniſmo.

Sterno Coſtales.

VESALIUS † conſidered theſe as forming a ſingle muſcle on each ſide, of a triangular ſhape; hence we find the name of *triangularis* adopted by Douglas and Albinus; but Verheyen, who firſt taught that they ought to be deſcribed as four or five diſtinct muſcles, gave them the name of *ſterno coſtales*; and in this he is very properly followed by Winſlow, Haller, and Lieutaud.

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* De Reſpir. Exper.

† Lib. xi.

These muſcles are ſituated at each ſide of the under ſurface of the ſternum, upon the cartilages of the third, fourth, fifth, and ſixth ribs. Their number varies in different ſubjects; very often there are only three, ſometimes five, and even ſix, but moſt uſually we find only four.

The lowermoſt of the ſterno coſtales, or what would be called the inferior portion of the triangularis, ariſes tendinous and fleſhy from the edge and inner ſurface of the lower part of the cartilago enſiformis, where its fibres intermix with thoſe of the diaphragm and tranſverſalis abdominis. Its fibres run nearly in a tranſverſe direction, and are inſerted, by a broad thin tendon, into the inner ſurface of the cartilage of the ſixth rib, and lower edge of that of the fifth.

The ſecond and largeſt of the ſterno coſtales, ariſes tendinous from the cartilago enſiformis and lower part of the ſternum, laterally, and, running a little obliquely outwards, is inſerted into the lower edge of the cartilage of the fifth, and ſometimes of the fourth rib.

The third ariſes tendinous from the ſides of the middle part of the ſternum, near the cartilages of the fourth and fifth ribs, and, aſcending obliquely outwards, is inſerted into the cartilage of the third rib.

The fourth and uppermoſt, which is the moſt frequently wanting, ariſes tendinous from the beginning of the cartilage of the third rib and the adjacent part of the ſternum, and running almoſt perpendicularly upwards, is inſerted by a thin tendon (which covers a part of the ſecond internal intercoſtal) into the cartilage and beginning of the bony part of the ſecond rib.

All theſe muſcles are more or leſs intermixed with one another at their origin, and this probably occaſioned them to be conſidered as one muſcle. Fallopius * informs us, that the plate Veſalius has given of them was taken from a dog, in which animal they are much larger than in man. Douglas † has endeavoured to account for this difference, but his explanation is far from being ſatisfactory.

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* Inſtit. p. 31.

† Myograph. Comp. Spec.

SECTION IV.

Of the Muſcles that ſurround the articulation of the lower Jaw.

THE articulation of the lower jaw is ſurrounded by four muſcles; viz. the temporalis, maſſeter, pterygoideus internus, and pterygoideus externus. The two firſt are ſituated on the ſide of the face, and the two laſt under the angle of the jaw.

Temporalis.

THIS muſcle, which Winſlow has named the *crotaphyte*, ariſes fleſhy from the lower, lateral, and anterior part of the parietal bone; from all the ſquamous portion of the temporal bone; from the lower and lateral part of the os frontis; from the poſterior ſurface of the os malæ; from all the temporal proceſs of the ſphenoid bone; and ſometimes from a ridge at the lower part of this proceſs. This latter portion, however, is often common to this muſcle and the pterygoideus externus. It is of a ſemi-circular ſhape, and its radiated fibres converge, ſo as to form a ſtrong middle tendon, which paſſes under the jugum, and is inſerted into the coronoid proceſs of the lower jaw, to which it adheres on every ſide, but more particularly at its fore part, where the inſertion is continued down to the body of the bone.

This muſcle is covered by a pretty ſtrong faſcia, which ſome writers have erroneouſly deſcribed as a part of the aponeuroſis of the occipito-frontalis. This faſcia adheres to the bones, round the whole circumference of the origin of the muſcle, and, deſcending over it, is fixed below to the ridge where the zygomatic proceſs begins, juſt above the meatus auditorius; to the upper edge of the zygomatic proceſs itſelf, and anteriorly to the os malæ. This faſcia ſerves as a defence to the muſcle, and likewiſe gives origin to ſome of its fleſhy fibres.

The principal uſe of the temporal muſcle is to draw the lower jaw upwards, as in the action of biting; and as it paſſes a little forwards to its inſertion, it may at the ſame time pull the condyle a little backwards, though not ſo much as it would have done if its fibres had paſſed in a direct line from their origin to their inſertion, becauſe the poſterior and lower part of the muſcle paſſes over the root of the zygomatic proceſs, as over a pulley.

Maſſeter.

THIS is a ſhort thick muſcle, which ariſes, by fleſhy and tendinous fibres, from the lower edge of the malar proceſs of the maxillary bone, the lower horizontal edge of the os malæ, and the lower edge of the zygomatic proceſs of the temporal bone, as far backwards as the eminence belonging to the articulation of the lower jaw. From ſome little interruption in the fibres of this muſcle, at their origin, ſome writers deſcribe it as ariſing by two, and others by three diſtinct portions, or heads. The two layers of fibres, of which it ſeems to be compoſed, croſs each other as they deſcend, the external layer extending backwards, and the internal one ſlanting forwards.

It is inſerted into the baſis of the coronoid proceſs, and into all that part of the lower jaw which ſupports the coronoid and condyloid proceſſes.

Its uſe is to raiſe the lower jaw, and, by means of the above-mentioned decuſſation, to move it a little forwards and backwards in the act of chewing; whence it has gotten its name, which is derived from μασισάομαι, *manduco*, to eat.

Pterygoideus Internus.

THIS ſtrong, ſhort muſcle, which derives its name from its origin, is called *pterygoideus major* by Winſlow. It ariſes tendinous and fleſhy from the whole inner ſurface of the external ala of the pterygoid proceſs, filling all the ſpace between the two wings; and from that proceſs of the os palati that makes part of the pterygoid foſſa. From thence the muſcle growing larger, deſcends obliquely downwards, forwards, and outwards, and is inſerted, by tendinous and fleſhy fibres, into the inſide of the lower jaw, near its angle.

This muſcle covers a great part of the *pterygoideus externus*; and along its poſterior edge we obſerve a ligamentous band, which extends from the back part of the ſtyloid proceſs to the bottom of the angle of the lower jaw.

The uſe of this muſcle is to raiſe the lower jaw, and to pull it a little to one ſide.

Pterygoideus Externus.

THIS, which was firſt diſcovered by Fallopius[*], is ſmaller than the laſt deſcribed muſcle, and is therefore named *pterygoideus minor* by Winſlow. It is placed, as it were, horizontally along the baſis of the ſcull, between the pterygoid proceſs and the condyle of the lower jaw.

It uſually ariſes by two diſtinct heads; one of which is thick, tendinous, and fleſhy, from the outer wing of the pterygoid proceſs of the os ſphenoides, and from a ſmall part of the os maxillare adjoining to it; the other is thin and fleſhy, from a ridge in the temporal proceſs of the ſphenoid bone, juſt behind the ſlit that tranſmits the veſſels to the eye. Sometimes this latter origin is wanting, and, in that caſe, part of the temporal muſcle ariſes from this ridge. Now and then it affords a common origin to both theſe muſcles.

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[*] Obſerv. Anatom.

From theſe origins the muſcle forms a ſtrong, fleſhy belly, which deſcends almoſt tranſverſely outwards and backwards, and is inſerted tendinous and fleſhy into a depreſſion in the fore part of the condyloid proceſs of the lower jaw, and into the anterior ſurface of the capſular ligament that ſurrounds the articulation of that bone.

All that part of this muſcle, which is not hid by the pterygoideus internus, is covered by a ligamentous expanſion, which is broader than that we ſpoke of in deſcribing the laſt muſcle, and originates from the inner edge of the glenoid cavity of the lower jaw, immediately before the ſtyloid proceſs of the temporal bone, and extends obliquely downwards, forwards, and outwards, to the inner ſurface of the angle of the jaw.

When theſe muſcles act together, they bring the jaw horizontally forwards. When they act ſingly, the jaw is moved forwards and to the oppoſite ſide. The fibres that are inſerted into the capſular ligament ſerve likewiſe to bring the moveable cartilage forwards.

SECTION V.

Of the Muſcles that are ſituated at the fore part of the Neck.

Latiſſimus Colli.

THIS broad and thin muſcle is the πλάτυσμα μυῶδες of Galen, the *quadratus genæ*, or *latiſſimus colli*, of Douglas, and the *muſculus cutaneus* of Winſlow. It is ſituated at the fore part of the neck, immediately under the common integuments, and extends from the clavicle to the angle of the mouth.

It ariſes from the cellular ſubſtance that covers the upper parts of the pectoral, deltoid, and trapezius muſcles, by fleſhy fibres, which extending obliquely upwards form a thin muſcle, ſome of the fibres of which paſs under the outer edge of the depreſſor anguli oris, and are inſerted into the ſide of the chin, while its external fibres are ſpread over the anterior edge and lower extremity of the maſſeter, and, extending obliquely upwards and inwards, are inſenſibly loſt in the integuments of the cheek, and in the neighbouring muſcles.

Its uſe ſeems to be, to aſſiſt in drawing the cheeks and ſkin of the face downwards; and, in the action of ſhutting the mouth, we ſhall find that it draws the ſkin, under the lower jaw, upwards.

Maſtoideus.

ALBINUS deſcribes this as two diſtinct muſcles, which, from their origin and inſertion, he names *ſterno-maſtoideus* and *cleido* *maſtoideus.* Winſlow, who conſiders it as one, calls it *ſterno-cleido-maſtoideus.* I have adopted the name given to it by Douglas, as being the moſt ſimple.

It is a long and pretty thick muſcle, ſituated obliquely on each ſide of the neck, and extending from behind the ear to the bottom of the throat, ſo that the two maſtoid muſcles, from their meeting in a point, have not been improperly compared to the letter V.

It ariſes by two diſtinct origins. One of theſe is tendinous and fleſhy, from the upper part of the ſternum; and the other fleſhy, from the upper and anterior part of the clavicle. Both theſe portions ſoon unite to form one muſcle, which is inſerted into the maſtoid proceſs, by a very broad and flat tendon which ſurrounds that proceſs, and extends backwards as far as the lambdoidal ſuture.

The uſe of this muſcle, when it acts ſingly, is to turn the head to one ſide, and when both act together, they bend the head forwards.

Coſto-Hyoideus.

I HAVE adopted this name from Santorini. Douglas and Albinus give it the name of *coraco-hyoideus*, but improperly, as it does not always ariſe from the coracoid proceſs. Winſlow, conſidering its general origin from the ſcapula, calls it the *omo-hyoideus*. It is a very long digaſtric muſcle, ſituated very obliquely at the ſide of the neck, between the ſcapula and os hyoides, and is in part covered by the maſtoideus.

It ariſes broad, thin, and fleſhy, from the ſuperior coſta of the ſcapula, near its ſemilunar niche; from ſome part of the ligament that extends from the edge of this niche to the root of the coracoid proceſs, and ſometimes by a few tendinous fibres from the proceſs itſelf; and thence, aſcending obliquely forwards and inwards, it becomes tendinous as it paſſes under the maſtoideus, but ſoon growing fleſhy again, is inſerted, by a ſhort thin tendon, into the baſis of the os hyoides, between its horn and the termination of the ſterno-hyoideus.

Its uſe is to pull the os hyoides obliquely downwards.

Sterno-Hyoideus.

AS this muſcle ariſes from the clavicle, as well as from the ſternum, Winſlow calls it *ſterno-cleido-hyoideus.* It is a long, flat, and thin muſcle, ſituated obliquely between the ſternum and os hyoides, behind the lower part of the maſtoideus, and covering the *ſterno-thyroideus* and the *hyo-thyroideus.*

It ariſes, by very ſhort tendinous fibres, from the cartilaginous part of the firſt rib, from the upper and inner part of the ſternum, from the capſular ligament that connects that bone with the clavicle, and commonly from a ſmall part of the clavicle itſelf; from thence, aſcending along the anterior and lateral part of the neck, we ſee it united to its fellow, oppoſite to the inferior part of the larynx, by means of a thin membrane, which forms a kind of *linea alba.* After this the two muſcles ſeparate again, and each paſſing over the ſide of the thyroid cartilage, is inſerted into the baſis of the os hyoides, immediately behind the inſertion of the laſt deſcribed muſcle.

Its uſe is to draw the os hyoides downwards.

Hyo-Thyroideus.

THIS is a ſhort, thin, flat, and fleſhy muſcle, ſituated under the upper part of the coſto-hyoideus and ſterno-hyoideus, between the lower edge of the os hyoïdes, and the ſide of the thyroid cartilage.

It ariſes fleſhy from part of the baſis, and almoſt all the cornu of the os hyoides, and is inſerted into the upper and anterior edge of a rough line, that runs obliquely at the ſide of the thyroid cartilage.

Its uſe is to pull the thyroid cartilage upwards, or the os hyoides downwards.

Sterno-

Sterno-Thyroideus.

THIS is flat and thin, like the preceding muſcle, but longer and broader. It is ſituated at the fore part of the neck, between the ſternum and thyroid cartilage, and behind the ſterno-hyoideus.

It ariſes broad and fleſhy from the upper and inner part of the ſternum, between the cartilages of the firſt and ſecond ribs, from each of which it receives ſome few fibres, as well as from the clavicle, where it joins with the ſternum. From thence, growing ſomewhat narrower, it aſcends, and, paſſing over the thyroid gland and the cricoid cartilage, is inſerted tendinous into the lower and poſterior edge of the rough line of the thyroid cartilage, immediately under the inſertion of the laſt deſcribed muſcle. Now and then a few of its fibres paſs on to the os hyoides.

Its uſe is to draw the thyroid cartilage, and conſequently the larynx, downwards.

Digaſtricus.

RIOLANUS* ſeems to have been the firſt who gave it this name, the etymology of which is from δίς and γαςήρ, becauſe it has two fleſhy fibres, with a middle tendon. Albinus, who has thought fit to give it a Latin name of the ſame ſignification, calls it *Biventer maxillæ.*

It is ſituated at the upper and anterior part of the neck, behind the latiſſimus colli and the maſtoideus, immediately under, and a little upon the inſide of the lower jaw, and outſide of the fauces, extending from the maſtoid proceſs to the chin.

It ariſes from the foſſa at the root of the maſtoid proceſs, and from a ridge upon the temporal bone, where it joins the os occipitis. The outſide of this origin, which is from the foſſa, is fleſhy, and the inſide, from the ridge, tendinous. From thence it paſſes obliquely forwards, downwards, and

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[*] Anthropog. lib. v.

inwards, for the ſpace of about two inches, and then forms a round tendon, which generally paſſes through the anterior end of the ſtylo-hyoideus; from the lower end of this tendon ſome fibres go off, which degenerate into a kind of faſcia, that binds it to the os hyoides, to which it is likewiſe ſecured by a ligamentous binding, that ſerves in ſome meaſure as a pulley. After this the tendon becomes ſomewhat broader, and, turning upwards, inwards, and forwards, gives origin to the anterior belly, which is only about half as long as the firſt, and is inſerted, tendinous and fleſhy, into a rough ſinuoſity on the under and anterior edge of the chin, almoſt contiguous to its fellow.

SOMETIMES each muſcle is found to have two anterior bellies. When this happens, the ſupernumerary one, which is uſually the ſmalleſt, does not go on to the chin, but, uniting with a ſimilar portion of the other muſcle, forms a middle tendon, which is generally fixed to the os hyoides. In ſome ſubjects, this irregularity occurs only on one ſide, and then we find it uniting with the middle tendon of the mylo-hyoideus, which is, in a great meaſure, covered by the anterior belly of the digaſtricus.

The principal uſe of this muſcle is to depreſs the lower jaw; and, when the mouth is ſhut, it helps to raiſe the os hyoides upwards, as happens in deglutition.

M. Ferrein* and others have contended, that the two bellies of this muſcle have different uſes; that only the anterior one ſerves to depreſs the jaw, while the poſterior portion aſſiſts in raiſing the upper jaw, and carrying the head backwards. But whoever will place his finger on the upper part of the maſtoid muſcle, juſt at the poſterior edge of the maſtoid proceſs, and then open his mouth, will eaſily feel the poſterior head of the digaſtricus ſwell conſiderably, ſo as to point out the direction of the muſcle. Nor can there be any deception in this; for there is no other muſcle, near it, that has the ſame direction.

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* Sur le Mouvement des deux Machoires.—Mem. de l'Acad. des Sciences, 1744.

Stylo-Hyoideus.

THIS is a ſmall, thin, fleſhy muſcle, ſituated between the ſtyloid proceſs and os hyoides, under the poſterior belly and middle tendon of the digaſtricus, near the upper edge of that muſcle.

It ariſes by a long thin tendon, from the baſis and poſterior edge of the ſtyloid proceſs, and, deſcending in an oblique direction, is inſerted into the lateral and anterior part of the os hyoides, near its horn.

The fleſhy belly of this muſcle is uſually perforated, on one or both ſides, for the paſſage of the middle tendon of the digaſtricus.

Sometimes, though not always, we find another ſmaller muſcle placed before the ſtylo-hyoideus, which, from its having nearly the ſame origin and inſertion, and the ſame uſe, is called *ſtylo-hyoideus-alter.* It ſeems to have been firſt known to Euſtachius [*]; ſo that Douglas was not aware of this circumſtance, when he placed it amongſt the muſcles diſcovered by himſelf. It ariſes from the apex of the ſtyloid proceſs, and ſometimes, by a broad and thin aponeuroſis, from the inner and poſterior part of the angle of the lower jaw, and is inſerted into the appendix or little horn of the os hyoides.

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[*] Tab. 41. fig. 5, 8, and 11.

The uſe of theſe muſcles is to pull the os hyoides to one ſide, and a little upwards.

Mylo-Hyoideus.

THIS muſcle, which was firſt deſcribed by Fallopius [*], is ſo called, from its origin near the *dentes molares* (μύλοι,) and its inſertion into the os hyoides.

It is a thin, flat muſcle, ſituated between the lower jaw and the os hyoides, and is covered by the anterior portion of the digaſtricus.

It ariſes fleſhy, and a little tendinous, from all the inner ſurface of the lower jaw, as far back as the inſertion of the pterygoideus internus, or, in other words, from between the laſt dens molaris and the middle of the chin, where it joins its fellow, to form one belly, with an intermediate tendinous ſtreak, or *linea alba*, which extends from the chin to the os hyoides, where both muſcles are inſerted into the lower edge of the baſis of that bone. This has induced Riolanus, Winſlow, Albinus, and others, to conſider it as a ſingle penniform muſcle.

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[*] Obſerv. Anatom.

Its uſe is to pull the os hyoides upwards, forwards, and to either ſide.

Genio-Hyoideus.

THIS muſcle is ſo called, on account of its origin from the chin (γένειον,) and its inſertion into the os hyoides. It is a long, thin, and fleſhy muſcle, and is ſituated behind the mylo-hyoideus, cloſe to its fellow, with which, in ſome ſubjects, it forms one muſcle.

It ariſes tendinous from a rough protuberance at the inſide of the chin, and, growing ſomewhat broader and thicker as it deſcends backwards, is inſerted, by very ſhort tendinous fibres, into both the edges of the baſis of the os hyoides.

Its uſe is to draw the os hyoides upwards and forwards.

Rectus Capitis Internus Major.

THIS, and the three following muſcles, form a layer, which is ſituated at the anterior part of the neck, cloſe to the vertebræ. It was known to the moſt ancient anatomiſts, but was not diſtinguiſhed by any particular name till the time of Cowper, who gave it its preſent appellation, which has been adopted by the generality of writers, except Winſlow, who calls it *rectus anterior longus.* It is a long muſcle, thicker and broader above than below; where it is thin, and terminates in a point.

It ariſes, by diſtinct flat tendons, from the anterior points of the tranſverſe proceſſes of the five inferior vertebræ of the neck, and, aſcending obliquely upwards, is inſerted into the anterior part of the cuneiform proceſs of the occipital bone.

The uſe of this muſcle is to bend the head forwards.

Rectus Capitis Internus Minor.

COWPER*, who was the firſt accurate deſcriber of this little muſcle, gave it the name of *rectus internus minor*, which has been adopted by Douglas and Albinus.—Winſlow calls it *rectus anterior brevis*. It is in part covered by the rectus major.

It ariſes fleſhy from the upper and fore part of the body of the firſt vertebra of the neck, near the origin of its tranſverſe proceſs, and, aſcending obliquely inwards, is inſerted near the root of the condyloid proceſs of the occipital bone, under the laſt-deſcribed muſcle. It aſſiſts in bending the head forwards.

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* Myotomia reformata.

Rectus Capitis Lateralis.

THIS muſcle ſeems to have been firſt deſcribed by Fallopius*. Winſlow calls it *tranſverſalis anticus primus.* It is ſomewhat larger than the rectus minor, but reſembles it in ſhape, and is ſituated immediately behind the internal jugular vein, at its coming out of the cranium.

It ariſes fleſhy from the upper and fore part of the tranſverſe proceſs of the firſt vertebra of the neck, and, aſcending a little obliquely upwards and outwards, is inſerted into the occipital bone, oppoſite to the ſtylo-maſtoid hole of the os temporis.

This muſcle ſerves to pull the head a little to one ſide.

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* Obſerv. Anatom.

Longus Colli.

THIS is a pretty conſiderable muſcle, ſituated cloſe to the anterior and lateral part of the vertebræ of the neck. Its outer edge is in part covered by the rectus internus major.

It ariſes tendinous and fleſhy within the thorax, from the bodies of the three ſuperior vertebræ of the back, laterally; from the bottom and fore part of the tranſverſe proceſſes of the firſt and ſecond vertebræ of the back, and of the laſt vertebra of the neck; and likewiſe from the upper and anterior points of the tranſverſe proceſſes of the ſixth, fifth, fourth, and third vertebræ of the neck, by as many ſmall diſtinct tendons; and is inſerted tendinous into the fore part of the ſecond vertebra of the neck, near its fellow.

This muſcle, when it acts ſingly, moves the neck to one ſide; but, when both act, the neck is brought directly forwards.

SECTION VI.

Of the Muſcles that are ſituated at the back part of the Trunk and Neck.

I INCLUDE all theſe muſcles in the ſame ſection, becauſe almoſt the whole poſterior part of the trunk is covered by the trapezius, and the latiſſimus dorſi; and thoſe of the poſterior part of the neck cannot be ſeen, till the trapezius, the rhomboideus, and the ſerratus ſuperior poſticus, are removed.

Trapezius, or *Cucullaris.*

RIOLANUS firſt gave this muſcle the name of trapezius, from τράπεζα, a word which ſignifies a quadrilateral figure; but Columbus, comparing it to a monk's hood as it lies between the ſhoulders, calls it *cucullaris.* I have followed Douglas, in retaining both theſe names. Albinus has adopted only the laſt, and Winſlow and the generality of the French writers only make uſe of the firſt.

This muſcle is ſituated immediately under the integuments of the poſterior part of the neck and back.

It ariſes, by a thick, round, and ſhort tendon, from the lower part of a protuberance in the middle of the occipital bone backwards, and from the rough line that is extended from thence towards the maſtoid proceſs of the os temporis, and by a thin membranous tendon, which covers part of the complexus and ſplenius. It then runs downwards along the nape of the neck, and riſes tendinous from the ſpinous proceſſes of the two lowermoſt vertebræ of the neck, and from the ſpinous proceſſes of all the vertebræ of the back, being inſeparably united to its fellow, the whole length of its origin, by tendinous fibres, which, in the nape of the neck, form what is called *ligamentum colli*, or the *cervical ligament.*

It is inſerted fleſhy into the broad and poſterior half of the clavicle, tendinous and fleſhy into one half of the acromion, and into almoſt all the ſpine of the ſcapula.

This muſcle ſerves to move the ſcapula in different directions. Its upper deſcending fibres pull it obliquely upwards; its middle tranſverſe ones pull it directly backwards; its inferior fibres, which aſcend obliquely upwards, draw it obliquely downwards and backwards.

The upper part of the muſcle acts upon the neck and head, the latter of which it draws backwards, and turns upon its axis. It likewiſe concurs with other muſcles in counteracting the flexion of the head forwards.

Rhomboideus.

THIS muſcle, which is ſo named from its ſhape, is ſituated immediately under the trapezius.—We find it uſually, though not always, divided into two portions, which Albinus deſcribes as two diſtinct muſcles. The uppermoſt of theſe, or *rhomboideus minor,* ariſes tendinous from the ſpinous proceſs of the three inferior vertebræ of the neck, and from the ligamentum colli; the lowermoſt, or *rhomboideus major*, ariſes tendinous from the ſpinous proceſſes of the back: the former is inſerted into the baſis of the ſcapula, oppoſite to its ſpine; the latter into all the baſis of the ſcapula, below its ſpine.

Its uſe is to draw the ſcapula obliquely upwards, and directly backwards.

Latiſſimus Dorſi.

THIS is a very broad, thin, and, for the moſt part, fleſhy muſcle, which is placed immediately under the ſkin, except where it is covered by the lower extremity of the trapezius.

It ariſes tendinous from the poſterior half of the upper edge of the ſpine of the os ilium, from the ſpinous proceſſes of the os ſacrum and lumbar vertebræ, and from five or ſix, and ſometimes from ſeven, and even eight, of the lowermoſt ones of the back; alſo tendinous and fleſhy from the upper edges and external ſurface of the four inferior falſe ribs, near their cartilages, by as many diſtinct ſlips.

From theſe different origins the fibres of the muſcle run in different directions; thoſe from the ilium and falſe ribs run almoſt perpendicularly upwards; thoſe from the ſacrum and lumbar vertebræ, obliquely upwards and forwards; and thoſe from the vertebræ of the back, tranſverſely outwards and forwards, over the inferior angle of the ſcapula, where they receive a ſmall thin bundle of fleſhy fibres, which ariſe tendinous from that angle, and are inſerted with the reſt of the muſcle, by a ſtrong, flat, and thin tendon, of about two inches in length, into the fore part of the poſterior edge of the groove we obſerved between the two tuberoſities of the os humeri, for lodging the tendon of the long head of the biceps. In diſſection, therefore, we ought not to follow this muſcle to its inſertion, till ſome of the other muſcles of the os humeri have been firſt raiſed.

Its uſe is to pull the os humeri downwards and backwards, and to turn it upon its axis. Riolanus[*], from its uſe on certain occaſions, gave it the name of *ani terſor.*—When we raiſe ourſelves upon our hands, as in riſing from off an arm chair, we may eaſily perceive the contraction of this muſcle.

We find a *burſa mucoſa* between the tendon of this muſcle and the os humeri, into which it is inſerted.

Serratus Inferior Poſticus.

THIS is a thin muſcle, of conſiderable breadth, ſituated at the bottom of the back, under the middle part of the latiſſimus dorſi.

It ariſes by a broad thin tendon, in common with that of the laſt deſcribed muſcle, from the ſpinous proceſſes of the two, and ſometimes of the three inferior dorſal vertebræ, and from three, and ſometimes four of thoſe of the lumbar vertebræ. It then becomes fleſhy, and, aſcending a little obliquely outwards and forwards, divides into three, and ſometimes four fleſhy ſlips, which are inſerted into the lower edges of the three or four inferior ribs, at a little diſtance from their cartilages.

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[*] Lib. v. cap. 24.

Its uſe ſeems to be to pull the ribs downwards, backwards, and outwards.

Levator Scapulæ.

THIS name, which was firſt given to it by Riolanus, has been adopted by Albinus. Douglas calls it *elevator* ſeu *muſculus patientiæ*; and Winſlow, *angularis* vulgo *levator proprius*.

It is a long muſcle, nearly two inches in breadth, and is ſituated obliquely under the anterior edge of the trapezius.

It ariſes tendinous and fleſhy from the tranſverſe proceſſes of the four, and ſometimes five ſuperior vertebræ colli, by ſo many diſtinct ſlips, which ſoon unite to form a muſcle that runs obliquely downwards and outwards, and is inſerted by a flat tendon into the upper angle of the ſcapula.

Its uſe is to raiſe the ſcapula upwards, and a little forwards.

Serratus Superior Poſticus.

THIS is a ſmall, flat, and thin muſcle, ſituated at the upper part of the back, immediately under the rhomboideus.

It ariſes, by a broad, thin tendon, from the lower part of the ligamentum colli, from the ſpinous proceſs of the laſt vertebra of the neck, and the two or three uppermoſt of the back, and is inſerted into the ſecond, third, fourth, and ſometimes fifth ribs, by as many diſtinct ſlips.

Its uſe is to expand the thorax, by pulling the ribs upwards and outwards.

Splenius.

THIS muſcle, according to ſome writers*, has gotten its name from its ſuppoſed reſemblance to the ſpleen, while others* derive it from *ſplenium*, a *ferula*, or ſplint, which ſurgeons apply to the ſides of a fractured bone. It is a flat, broad, and oblong muſcle, in part covered by the upper part of the trapezius, and obliquely ſituated between the back of the ear, and the lower and poſterior part of the neck.

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* Sabatier. Traité d'Anatomie.

It ariſes tendinous from the four or five ſuperior ſpinous proceſſes of the dorſal vertebræ; tendinous and fleſhy from the laſt of the neck, and tendinous from the ligamentum colli, or rather the tendons of the two ſplenii unite here inſeparably; but about the ſecond or third vertebra of the neck they recede from each other, ſo that part of the complexus may be ſeen.

It is inſerted, by two diſtinct tendons, into the tranſverſe proceſſes of the two firſt vertebræ of the neck, ſending off ſome few fibres to the complexus and levator ſcapulæ; tendinous and fleſhy into the upper and poſterior part of the maſtoid proceſs, and into a ridge on the occipital bone, where it joins with the root of that proceſs.

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* Douglas.

This muſcle may eaſily be ſeparated into two parts. Euſtachius and Fallopius were aware of this; Winſlow has diſtinguiſhed them into the *ſuperior* and *inferior* portions; and Albinus has deſcribed them as two diſtinct muſcles, calling that part which is inſerted into the maſtoid proceſs and os occipitis, *ſplenius capitis*, and that which is inſerted into the vertebræ of the neck, *ſplenius colli*. As we wiſh to facilitate the ſtudy of myology, we have followed Douglas, and the generality of writers, in deſcribing theſe two portions as one muſcle, eſpecially as they are intimately united near their origin.

When this muſcle acts ſingly, it draws the head and upper vertebræ of the neck obliquely backwards; when both act, they pull the head directly backwards.

Complexus.

THIS muſcle, which is ſo called on account of its complicated ſtructure, is named *complexus major* by Winſlow, in order to diſtinguiſh it from the *trachelo-maſtoideus*, which he calls *complexus minor*. It is a pretty long and broad muſcle, and is placed near its fellow, at the poſterior lateral part of the neck, being in part covered by the ſplenius.

It ariſes from the tranſverſe proceſſes of the four or five firſt vertebræ of the back, and from thoſe of the ſix inferior vertebræ of the neck, by as many diſtinct tendons, which are ſhorter below than above. It then runs upwards, and, in its aſcent, uſually receives a fleſhy ſlip, which ariſes tendinous from the ſpinous proceſs of the firſt, and ſometimes of the firſt and ſecond vertebræ of the neck; and the whole muſcle being intermixed with tendinous and fleſhy fibres, is inſerted, by a flat tendon, into the lateral and middle part of the protuberance in the middle of the occipital bone, and into a part of the ridge that runs forwards from that protuberance.

This muſcle is ſometimes divided into two portions. The inferior one, which is narroweſt, is compoſed of two fleſhy bellies, ſeparated by a roundiſh middle tendon, on which account Albinus, who deſcribes it as a diſtinct muſcle, calls it *biventer cervicis*, giving the name of *complexus* only to the other portion. This diſtinction, however, which had before been noticed by Veſalius, Cowper, and others, is not obſervable in every ſubject, ſo that we very often find the two portions inſeparably united to each other.

When this muſcle acts ſingly, the head is drawn backwards and a little to one ſide; when both act, the head is drawn directly backwards.

Trachelo-Maſtoideus.

DOUGLAS and Albinus give it this name from its origin and inſertion; its origin being chiefly from the neck, (τϱαιχηλὸς, *collum*,) and its inſertion into the maſtoid proceſs. Fallopius[*], who firſt deſcribed this muſcle and its fellow, gave them the name of *capitis par tertium*. Winſlow calls it *com-*

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[*] Obſerv. Anatom.

plexus minor ſeu *maſtoideus lateralis.* Veſalius conſidered it as a portion of the complexus.

It is a ſmall, long, thin, narrow, and ſerrated muſcle, ſituated at the poſterior and lateral part of the neck, under the cervical portion of the ſplenius, by which it is in part covered.

It ariſes from the tranſverſe proceſſes of the firſt, and ſometimes of the firſt and ſecond vertebræ of the back, and from three of the four, and ſometimes five inferior vertebræ of the neck, by as many diſtinct tendons, which unite to form a fleſhy belly, that runs directly upwards, and is inſerted, by a thin flat tendon, into the lower and poſterior part of the maſtoid proceſs.

The fleſhy belly of this muſcle is intermixed with a few tendinous fibres, and it ſometimes receives a ſmall faſciculus of fleſhy fibres from the longiſſimus dorſi.

Its uſe is to keep the head and neck erect, or to draw the head backwards, when both

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both muſcles act. When it acts ſingly, the head is drawn obliquely backwards.

Rectus Capitis Poſticus Major.

THIS, which is the *rectus major* of Douglas and Winſlow, is a ſmall, ſhort, and flat muſcle, broader above than below, and is ſituated, not in a ſtraight direction, as its name would inſinuate, but obliquely between the occiput and the ſecond vertebra of the neck, immediately under the complexus.

It ariſes, by a ſhort thick tendon, from the upper and poſterior part of the ſpinous proceſs of the ſecond vertebra of the neck; it ſoon becomes broader, and, aſcending obliquely outwards, is inſerted, by a flat tendon, into the external lateral part of the lower ſemi circular ridge of the os occipitis.

The uſe of this muſcle is to extend the head, and to pull it backwards.

Rectus Capitis Poſticus Minor.

THIS is the *rectus minor* of Douglas and Winſlow. It is ſmaller than the laſt deſcribed muſcle, but reſembles it in ſhape, and is placed cloſe by its fellow, in the ſpace between the *recti majores.*

It ariſes, by a ſhort thick tendon, from the upper and lateral part of a little protuberance in the middle of the back part of the firſt vertebra of the neck, and, becoming broader and thinner as it aſcends, is inſerted, by a broad flat tendon, into the occipital bone, immediately under the inſertion of the laſt deſcribed muſcle.

Its uſe is to aſſiſt the rectus major in drawing the head backwards.

Obliquus Superior Capitis.

RIOLANUS, who was the firſt that gave particular names to the oblique muſcles of the head, called this muſcle *obliquus minor*, to diſtinguiſh it from the following, which, on account of its being much larger, he named *obliquus major.* Spigelius afterwards diſtinguiſhed the two, from their ſituation with reſpect to each other, into *ſuperior* and *inferior*; and in this he is followed by Cowper and Douglas. Winſlow retains both names. I have adopted that uſed by Albinus.

This little muſcle, which is nearly of the ſame ſhape as the *recti capitis*, is ſituated laterally between the occiput and the firſt vertebra of the neck, and is covered by the complexus and the upper part of the ſplenius.

It ariſes, by a ſhort thick tendon, from the upper and poſterior part of the tranſverſe proceſs of the firſt vertebra of the neck, and, aſcending obliquely inwards and backwards, becomes broader, and is inſerted, by a broad flat tendon and ſome few fleſhy fibres, into the os occipitis, behind the back part of the maſtoid proceſs, under the inſertion of the complexus and ſplenius, and a little above that of the rectus major.

The uſe of this muſcle is to draw the head backwards, and perhaps to aſſiſt in its rotatory motion.

Obliquus Inferior Capitis.

I HAVE already obſerved that this is larger than the laſt deſcribed muſcle. It is very obliquely ſituated between the two firſt vertebræ of the neck.

It ariſes tendinous and fleſhy from the middle and outer ſide of the ſpinous proceſs of the ſecond vertebra of the neck, and is inſerted, tendinous and fleſhy, into the lower and poſterior part of the tranſverſe proceſs of the firſt vertebra.

Its uſe is to turn the firſt vertebra upon the ſecond, as upon a pivot, and to draw the face towards the ſhoulder.

Sacro Lumbalis.

THIS and the following muſcles are ſituated under the ſerrati poſtici, rhomboideus, trapezius, and latiſſimus dorſi. It is a long muſcle, thicker and broader below than above, and extends from the os ſacrum to the lower part of the neck.

It ariſes in common with the longiſſimus dorſi, tendinous without, and fleſhy within, from the poſterior part of the os ſacrum; from the poſterior edge of the ſpine of the ilium; from all the ſpinous proceſſes, and from near the roots of the tranſverſe proceſſes of the lumbar vertebræ. At the bottom of the back it ſeparates from the longiſſimus dorſi, with which it had before formed, as it were, only one muſcle, and aſcending obliquely outwards, gradually diminiſhes in thickneſs, and terminates above in a very narrow point. From the place where it quits the longiſſimus dorſi, to that of its termination, we find it fleſhy at its poſterior, and tendinous at its anterior edge. This tendinous ſide ſends off as many long and thin tendons as there are ribs. The lowermoſt of theſe tendons are broader, thicker, and ſhorter than thoſe above; they are inſerted into the inferior edge of each rib, where it begins to be curved forwards towards the ſternum, excepting only the uppermoſt and laſt tendon, which ends in the poſterior and inferior part of the tranſverſe proceſs of the laſt vertebra of the neck.

From the upper part of the five, ſix, ſeven, eight, nine, ten, or eleven lower ribs, (for the number, though moſt commonly ſeven or eight, varies in different ſubjects,) ariſe as many thin bundles of fleſhy fibres, which, after a very ſhort progreſs, terminate in the inner ſide of this muſcle, and have been named by Steno *, *muſculi ad ſacro lumbalem acceſſorii.* Beſides theſe, we find the muſcle ſending off a fleſhy ſlip from its upper part, which is inſerted into the poſterior and inferior part of the tranſverſe proceſſes of the five inferior vertebræ of the neck, by as many diſtinct tendons. This is generally deſcribed as a diſtinct muſcle. Diemerbroeck, and Douglas and Albinus after him, call it *cervicalis deſcendens.* Winſlow names it *tranſverſalis collateralis colli.* I have followed

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* De Muſculis, &c. Obſerv. Specimen.

Morgagni *, in conſidering it as an appendage to the ſacro lumbalis.

The uſes of this muſcle are to aſſiſt in erecting the trunk of the body, in turning it upon its axis or to one ſide, and in drawing the ribs downwards. By means of its upper ſlip, it ſerves to turn the neck obliquely backwards, or to one ſide.

Longiſſimus Dorſi.

THIS muſcle, which is ſomewhat thicker than the ſacro-lumbalis, greatly reſembles it, however, in its ſhape and extent, and ariſes in common with that muſcle, between it and the ſpine. It aſcends upwards along the ſpine, and is inſerted, by ſmall double tendons, into the poſterior and inferior part of all the tranſverſe proceſſes of the vertebræ of the back, and ſometimes of the laſt vertebra of the neck. From its outſide it ſends off ſeveral bundles of fleſhy fibres, interſperſed with a few tendinous filaments, which are uſually inſerted into the lower edge of the ten uppermoſt ribs, not far from their tubercles. In ſome ſubjects, however, they are found inſerted into a leſs number, and in others, though more rarely, into every one of the ribs.

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* Adverſ. Anat. 2, xv.

TOWARDS the upper part of this muſcle, we obſerve a broad and thin portion of fleſhy fibres, which croſs, and intimately adhere to the fibres of the longiſſimus dorſi. This portion ariſes from the upper and poſterior part of the tranſverſe proceſſes of the five or ſix uppermoſt vertebræ of the back, by as many tendinous origins, and is uſually inſerted, by ſix tendinous and fleſhy ſlips, into the tranſverſe proceſſes of the ſix inferior vertebræ of the neck. This portion is deſcribed by Winſlow and Albinus as a diſtinct muſcle; by the former under the name of *tranſverſalis major colli*, and by the latter under that of *tranſverſalis cervicis*. But its fibres are ſo intimately connected with thoſe of the longiſſimus dorſi, that we may very properly conſider it as an appendage to the latter.

The uſe of this muſcle is to extend the vertebræ of the back, and to keep the trunk of the body erect; by means of its appendage, it likewiſe ſerves to turn the neck obliquely backwards, and a little to one ſide.

Spinalis Dorſi.

THIS is the name given by Albinus to a tendinous and fleſhy maſs, which is ſituated along the ſpinous proceſſes of the back and the inner ſide of the longiſſimus dorſi.

It ariſes tendinous and fleſhy from the ſpinous proceſſes of the uppermoſt vertebræ of the loins, and the lowermoſt ones of the back, and is inſerted into the ſpinous proceſſes of the nine uppermoſt vertebræ of the back.

Its uſe is to extend the vertebræ, and to aſſiſt in raiſing the ſpine.

Semi-ſpinalis Dorſi.

THIS muſcle ariſes from the tranſverſe proceſſes of the ſeventh, eighth, ninth, and tenth dorſal vertebræ, by ſo many diſtinct tendons, which ſoon grow fleſhy, and then becoming tendinous again, are inſerted tendinous into the ſpinous proceſſes of all the dorſal vertebræ, above the eighth, and into the lowermoſt of the back.

THIS muſcle aſſiſts in extending the ſpine obliquely backwards.

Multifidus Spinæ.

THE generality of anatomical writers have unneceſſarily multiplied the muſcles of the ſpine, and hence their deſcriptions of theſe parts are confuſed, and difficult to be underſtood. Under this name of *multifidus ſpinæ*, Albinus has therefore very properly included thoſe portions of muſcular fleſh, intermixed with tendinous fibres, which lie cloſe to the poſterior part of the ſpine, and which Douglas and Winſlow have deſcribed as three diſtinct muſcles, under the names of *tranſverſales*, or *tranſverſo-ſpinales*, of the loins, back, and neck.

The multifidus ſpinæ ariſes tendinous and fleſhy from the upper convex ſurface of the os ſacrum, from the poſterior adjoining part of the ilium, from the oblique and tranſverſe proceſſes of all the lumbar vertebræ, from the tranſverſe proceſſes of all the dorſal vertebræ, and from thoſe of the cervical vertebræ, excepting the three firſt. From all theſe origins the fibres of the muſcle run in an oblique direction, and are inſerted, by diſtinct tendons, into the ſpinous proceſſes of all the vertebræ of the loins and back, and likewiſe into thoſe of the ſix inferior vertebræ of the neck.

When this muſcle acts ſingly, it extends the back obliquely, or moves it to one ſide; when both muſcles act, they extend the vertebræ backwards.

Spinalis Cervicis.

THIS muſcle, which is ſituated cloſe to the vertebræ at the poſterior part of the neck and upper part of the back, ariſes, by diſtinct tendons, from the tranſverſe proceſſes of the five or ſix uppermoſt vertebræ of the back, and, aſcending obliquely under the complexus, is inſerted, by ſmall tendons, into the ſpinous proceſſes of the ſixth, fifth, fourth, third, and ſecond vertebræ of the neck.

Its uſe is to extend the neck obliquely backwards.

Scalenus.

ANATOMICAL writers have differed greatly in their deſcriptions of this muſcle, which is ſituated at the ſide of the neck, between the tranſverſe proceſſes of the cervical vertebræ and the upper part of the thorax. The ancients, who gave it its name from its reſemblance to an irregular triangle (σκαληνὸς), conſidered it as one muſcle. Veſalius and Winſlow * divide it into two; Fallopius and Cowper into three; Douglas into four †, and Albinus ‡ into five portions, which they deſcribe as diſtinct muſcles.

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* Scalenus primus, ſcalenus ſecundus.

† Firſt, ſecond, third, and fourth ſcalenus.

‡ Scalenus prior, ſcalenus minimus, ſcalenus lateralis, ſcalenus medius, ſcalenus poſticus.

Without deviating in the leaſt from anatomical accuracy, we may conſider it as one muſcle, divided into three portions.

The *anterior* portion ariſes commonly from the tranſverſe proceſſes of the ſix inferior vertebræ of the neck, by as many ſhort tendons, and, deſcending obliquely outwards, is inſerted, tendinous and fleſhy, into the upper ſide of the firſt rib, near its cartilage. The axillary artery paſſes through this portion, and ſometimes divides it into two ſlips, about an inch and a half above its inſertion.

The *middle* portion ariſes, by diſtinct tendons, from the tranſverſe proceſſes of the four laſt vertebræ of the neck, and, deſcending obliquely outwards and a little backwards, is inſerted tendinous into the outer and upper part of the firſt rib, from its root to within the diſtance of an inch from its cartilage. The ſpace between this and the anterior portion, affords a paſſage to the nerves going to the upper extremities. It is in part covered by the third or *poſterior* portion, which is the thinneſt and longeſt of the three. This ariſes from the tranſverſe proceſſes of the ſecond, third, fourth, and fifth vertebræ of the neck, by diſtinct tendons, and is inſerted into the upper edge of the ſecond rib, at the diſtance of about an inch and a half from its articulation, by a broad flat tendon.

The uſe of the ſcalenus is to move the neck to one ſide, when it acts ſingly, or to bend it forwards, when both muſcles act; and when the neck is fixed, it ſerves to elevate the ribs and dilate the cheſt.

Inter-ſpinales.

THE ſpace between the ſpinous proceſſes of the ſix inferior cervical vertebræ, is filled up with ſmall portions of muſcular fleſh, which ariſe from the ſpinous proceſſes of the inferior vertebræ of the neck, and are inſerted into the ſpinous proceſſes of the ſuperior vertebræ.

Their uſe is to draw theſe proceſſes nearer to each other.

ANATOMICAL writers, following the uſual diviſion of the ſpine into neck, back, and loins, commonly divide theſe muſcles into *inter-ſpinales cervicis*, *inter-ſpinales dorſi*, and *inter-ſpinales lumborum*; but there does not ſeem to be any good foundation for this, as we do not find any ſuch muſcles either on the back or loins.

Inter-tranſverſales.

THESE differ from the laſt deſcribed muſcles only in their ſituation, which is between the tranſverſe proceſſes of the vertebræ. We meet with them between the tranſverſe proceſſes of the ſix inferior vertebræ of the neck, and likewiſe between thoſe of the lumbar vertebræ, ſo that we may not improperly diſtinguiſh them into *inter-tranſverſales cervicis*, and *inter-tranſverſales lumborum*; for what have been uſually deſcribed as the *inter-tranſverſales dorſi*, are (like the inter-ſpinales dorſi and lumborum) rather ſmall tendons than muſcles, ſerving to connect the proceſſes to each other.

SECTION VII.

Of the Muſcles ſituated on the anterior and lateral parts of the Spine, within the cavity of the Abdomen.

Pſoas Parvus.

THIS muſcle, which was firſt deſcribed by Riolanus, is ſituated upon the pſoas magnus, at the anterior part of the loins. From this ſituation the two muſcles have gotten their name, which is derived from ψόα, *lumbus.*

THE pſoas parvus ariſes thin and fleſhy from the ſide of the uppermoſt vertebra of the loins, and ſometimes alſo from the lower edge of the laſt vertebra of the back, and from the tranſverſe proceſſes of each of theſe vertebræ; it then extends over part of the pſoas magnus, and terminates in a thin flat tendon, which is inſerted into that part of the brim of the pelvis, where the os pubis joins the ilium.—From this tendon a great number of fibres are ſent off, which form a thin faſcia, that covers part of the pſoas magnus and iliacus internus, and gradually loſes itſelf on the fore part of the thigh.

In the human body this muſcle is very often wanting; but in a dog, according to Douglas [*], it is never deficient.—Riolanus was of opinion, that it occurs oftner in men than in women; Winſlow aſſerts juſt the contrary; but the truth ſeems to be, that it is as often wanting in one ſex as in the other.

Its uſe ſeems to be to aſſiſt the pſoas magnus in bending the loins forwards; and when we are lying upon our back, it may help to raiſe the pelvis.

Pſoas Magnus.

THIS is a long, thick, and very conſiderable muſcle, ſituated cloſe to the fore part and ſides of the lumbar vertebræ.

It ariſes from the bodies of the laſt vertebra of the back, and of all the lumbar vertebræ laterally, as well as from the anterior ſurfaces of their tranſverſe proceſſes, by diſtinct tendinous and fleſhy ſlips, that are gradually collected into one maſs, which becomes thicker as it deſcends, till it reaches the laſt of the lumbar vertebræ, where it grows narrower again, and, uniting at its outer and poſterior edge (where it begins to become tendinous) with the iliacus internus, deſcends along with that muſcle under the ligamentum Fallopii, and goes to be inſerted tendinous at the bottom of the trochanter minor of the os femoris, and fleſhy into the bone a little below that proceſs — Between the tendon of this muſcle and the iſchium, we find a conſiderable burſa mucoſa.

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[*] Myograph. Comp. Spec.

This muſcle, at its origin, has ſome connection with the diaphragm, and likewiſe with the quadratus lumborum. It is one of the moſt powerful flexors of the thigh forwards, and may likewiſe aſſiſt in turning it outwards. When the inferior extremity is fixed, it may help to bend the body forwards, and in an erect poſture, it greatly aſſiſts in preſerving the equilibrium of the trunk upon the upper part of the thigh.

Iliacus Internus.

THIS is a thick, broad, and radiated muſcle, which is placed upon the inner ſurface of the ilium.

It ariſes fleſhy from all the inner lip of the ilium, from moſt of the hollow part, and likewiſe from the edge of that bone, between its anterior ſuperior ſpinous proceſs and the acetabulum. It joins with the pſoas magnus, where it begins to become tendinous, and, paſſing under the ligamentum Fallopii, is inſerted in common with that muſcle.

M. Portal * has ſeen the tendon of this muſcle diſtinct from that of the pſoas, and, in ſome ſubjects, has found it divided into two portions.

The iliacus internus ſerves to aſſiſt the pſoas magnus in bending the thigh, and in bringing it directly forwards.

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* Anat. Hiſtor. et Pratique de Lieutaud, tome i.

Quadratus Lumborum.

THIS is a ſmall, flat, and oblong muſcle, that has gotten the name of *quadratus* from its ſhape, which is that of an irregular ſquare. It is ſituated laterally, at the lower part of the ſpine.

It ariſes, tendinous and fleſhy, from about two inches of the poſterior part of the ſpine of the ilium. From this broad origin it aſcends obliquely inwards, and is inſerted into the tranſverſe proceſſes of the four ſuperior lumbar vertebræ, into the lower edge of the laſt rib, and, by a ſmall tendon, that paſſes up under the diaphragm, into the ſide of the laſt vertebra of the back.

When this muſcle acts ſingly, it draws the loins to one ſide; when both muſcles act, they ſerve to ſupport the ſpine, and perhaps to bend it forwards. In laborious reſpiration, the quadratus lumborum may aſſiſt in pulling down the ribs.

Coccygæus.

THIS muſcle, which was firſt deſcribed by Douglas *, is nearly of a triangular ſhape. It is ſituated at the lower and inner part of the pelvis, between the ſpine of the iſchium and the lower and lateral parts of the coccyx and ſacrum.

It ariſes, tendinous and fleſhy, from the inner and poſterior edge of the ſpine of the iſchium, near its extremity. From this narrow origin it gradually ſpreads into a thin fleſhy belly, interſperſed with tendinous fibres, and is inſerted into almoſt the whole length of the os coccygis laterally, and likewiſe into the inferior part of the os ſacrum.

The anterior edge of this muſcle is united with the levator ani, and, with that muſcle, ſerves to cloſe the lower part of the pelvis, and to ſupport the viſcera contained in it. It likewiſe ſerves to draw the os coccygis inwards and forwards.

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* Myograph. Comp. Spec.

SECTION VIII.

Of the Muſcles ſituated on the Scapula, and at the upper part of the Os Humeri.

Deltoides.

THIS, which is ſo called, on account of its ſuppoſed reſemblance to the Greek letter Δ reverſed, is a ſtrong, thick, and fleſhy muſcle, covering the anterior part of the joint of the os humeri, and ſituated immediately under the integuments, except a ſmall part of it, which is hid by the inferior extremity of the latiſſimus colli.

IT ariſes, tendinous and fleſhy, from all the outer and poſterior part of the clavicle that the pectoralis does not poſſeſs, from the convex part of the acromion, and likewiſe from the lower edge of the ſpine of the ſcapula, as far as the triangular ſurface, which terminates it poſteriorly. From theſe ſeveral origins the fibres of the muſcle run in different directions; thoſe from the ſpine of the ſcapula running downwards and obliquely outwards, thoſe from the acromion immediately downwards, and thoſe from the clavicle downwards and outwards. They are all collected into a point at the inferior extremity of the muſcle, and inſerted, by a ſtrong tendon, into a rough protuberance at the anterior part of the os humeri, near its middle, cloſe to the origin of the brachialis internus. This tendon, which adheres to the os humeri in an extent of near an inch and a half, is much more conſiderable at the poſterior ſurface of the muſcle next to the bone, than it is anteriorly, where it is almoſt entirely covered with fleſhy fibres.

THIS muſcle is compoſed of a great number of faſciculi, which are eaſily ſeparable from one another. Hence we find Albinus dividing it into ſeven portions, the three foremoſt of which are ſeparated from the reſt by a conſiderable cellular interſtice. All theſe faſciculi are incloſed in a tendinous faſcia, which deſcends to the lower part of the muſcle, and then loſes itſelf in the aponeuroſis that is ſpread over the muſcles of the arm.

The principal uſe of the deltoides is to draw the arm directly upwards; and when the arm is raiſed, it will be moved a little forwards or backwards, according to the different directions of the anterior and poſterior portions of the muſcle.

Supra-Spinatus.

THIS muſcle, which was firſt ſo named by Riolanus, from its ſituation, is of conſiderable thickneſs, wider behind than before, and fills the whole of the cavity or foſſa that is above the ſpine of the ſcapula.

It ariſes fleſhy from the whole of the baſe of the ſcapula that is above its ſpine, and likewiſe from the ſpine itſelf, and from the ſuperior coſta. Oppoſite to the baſis of the coracoid proceſs, we find it beginning to degenerate into a tendon, which is at firſt covered by fleſhy fibres, and then paſſing under the acromion, adheres to the capſular ligament of the os humeri, and is inſerted into the upper part of the large tuberoſity at the head of the os humeri.

This muſcle is covered by a thin faſcia, which adheres to the upper edge and ſuperior part of the baſis, as well as to the upper edge of the ſpine of the ſcapula.

The principal uſe of the ſupra-ſpinatus ſeems to be to aſſiſt in raiſing the arm upwards; at the ſame time, by drawing the capſular ligament upwards, it prevents it from being pinched between the head of the os humeri and that of the ſcapula. It may likewiſe ſerve to move the ſcapula upon the humerus.

Infra-Spinatus.

THIS muſcle, which fills the foſſa below the ſpine of the ſcapula, is nearly of a triangular ſhape; a conſiderable part of it is covered by the deltoides.

It ariſes fleſhy from all that part of the baſis of the ſcapula that is between its ſpine and its lower angle, and likewiſe from the ſpine itſelf, as far as the neck of the ſcapula. Its fibres run towards a middle tendon, ſome in an oblique, and others in a tranſverſe direction. This tendon adheres to the upper and inner part of the capſular ligament of the joint, and is inſerted into the upper and middle part of the great tuberoſity of the os humeri.

This muſcle is covered by a tendinous membrane, which likewiſe envelops the teres minor.

The infra-ſpinatus ſerves to turn the os humeri upon its axis outwards; to aſſiſt in raiſing the arm, and in moving it outwards when raiſed; and likewiſe to prevent the capſular ligament from being pinched in the motions of the joint.

Teres Minor.

THIS muſcle ſeems to have been firſt deſcribed by Fallopius. Riolanus, who was the firſt that diſtinguiſhed this and the other muſcles of the ſcapula by particular appellations, gave the name of *teres* to this and the following muſcle, on account of their long and round ſhape. The teres minor is a thin fleſhy muſcle, ſituated along the inferior edge of the infra-ſpinatus, and is in part covered by the poſterior part of the deltoides.

It ariſes fleſhy from all the convex edge of the inferior coſta of the ſcapula; from thence it aſcends obliquely upwards and forwards, and terminates in a flat tendon, which adheres to the lower and poſterior part of the capſular ligament of the joint, and is inſerted into the lower part of the great tuberoſity of the os humeri, a little below the termination of the infra-ſpinatus.

The tendinous membrane, which, as we juſt now obſerved, is continued from the infra-ſpinatus, and ſpread over the teres minor, likewiſe forms a thin ſeptum between the two muſcles. In ſome ſubjects, however, they are ſo cloſely united, as to be with difficulty ſeparated from each other. Some of the fibres of the teres minor are intermixed with thoſe of the teres major and ſubſcapularis.

The uſes of this muſcle are ſimilar to thoſe of the infra-ſpinatus.

Teres Major.

THIS muſcle, which is longer and thicker than the teres minor, is ſituated along the inferior coſta of the ſcapula, and is in part covered by the deltoides.

It ariſes fleſhy from the outer ſurface of the inferior angle of the ſcapula, (where it covers ſome part of the infra-ſpinatus and teres minor, with both which its fibres intermix,) and likewiſe from the lower and poſterior half of the inferior coſta of the ſcapula. Aſcending obliquely towards the os humeri, it paſſes under the long head of the triceps brachii, and then becomes thinner and flatter, to form a thin tendon of about an inch in breadth, and ſomewhat more in length, which runs immediately behind that of the latiſſimus dorſi, and is inſerted along with it into the ridge at the inner ſide of the groove that lodges the long head of the biceps. Theſe two tendons are included in a common capſula, beſides which the tendon of this muſcle adheres to the os humeri, by two other capſulæ, which we find placed one above the other.

THIS muſcle aſſiſts in the rotatory motion of the arm, and likewiſe in drawing it downwards and backwards; ſo that we may conſider it as the congener of the latiſſimus dorſi.

Subſcapularis.

THE name of this muſcle ſufficiently indicates its ſituation. It is compoſed of many faſciculi of tendinous and fleſhy fibres, the marks of which we ſee imprinted on the under ſurface of the ſcapula. Theſe faſciculi, which ariſe from all the baſis of that bone internally, and likewiſe from its ſuperior, as well as from one half of its inferior coſta, unite to form a conſiderable flat tendon which adheres to the capſular ligament, and is inſerted into the upper part of the leſſer tuberoſity at the head of the os humeri.

The principal uſe of this muſcle is to roll the arm inwards. It likewiſe ſerves to bring it cloſe to the ribs; and, from its adheſion to the capſular ligament, it prevents that membrane from being pinched.

Coraco-brachialis.

THIS, which derives its name from its origin and inſertion, is a long muſcle, placed between the coracoid proceſs of the ſcapula, and the upper, inner, and middle part of the os humeri, and is covered by the deltoides and pectoralis.

It ariſes, by tendinous and fleſhy fibres, from the inferior ſurface and inner part of the coracoid proceſs of the ſcapula, and, in its deſcent, adheres to the poſterior ſurface and inner edge of the ſhort head of the biceps. It becomes ſomewhat thicker as it deſcends, and runs obliquely forwards and outwards, to be inſerted, tendinous and fleſhy, into about the middle of the inner ſide of the os humeri, between the brachialis internus and the third head of the triceps brachii.

The muſculo-cutaneous nerve paſſes through the lower part of this muſcle. This circumſtance having been firſt noticed by Caſſerius, an ingenious Italian anatomiſt, many writers have given the name of *perforatus Caſſerii* to this muſcle, but improperly, as the muſcle itſelf had before been deſcribed by Veſalius and others.

The principal uſe of this muſcle is to move the arm upwards and forwards. It may likewiſe aſſiſt the infra-ſpinatus and teres minor, in rolling the os humeri outwards.

SECTION IX.

Of the Muſcles ſituated on the Os Humeri.

THESE are three in number, viz. the *biceps brachii*, *brachialis internus*, and *triceps brachii*. The two firſt are placed at the anterior, and the laſt at the poſterior part of the arm.

Biceps Brachii.

THIS is the *biceps internus* of Douglas, and the *biceps* or *coraco-brachialis*, of Winſlow. The upper part of it is covered by the deltoides, and by the tendon of the pectoralis; its inferior tendon dips down between the muſcles of the upper part of the fore-arm; every other part of it is placed immediately under the integuments.

It ariſes, as its name indicates, by two heads. The firſt and innermoſt, which is the ſhorteſt and thickeſt of the two, ſprings, by a broad tendon, from the lower and outer part of the coracoid proceſs of the ſcapula, in common with the coraco-brachialis. The ſecond and outermoſt, or *long head* of the biceps, originates by a long, thin, and broad tendon, from the upper and outer part of the edge of the glenoid cavity of the ſcapula. This tendon becomes thinner and flatter as it paſſes over the head of the os humeri, within the joint, and running between the two tuberoſities of that bone, begins to aſſume a roundiſh ſhape, and is lodged in a groove deſcribed in the oſteological part of this work, and incloſed within a membrane, which is a prolongation of the capſular ligament of the joint. Theſe two heads unite a little below the middle of the os humeri, anteriorly, and form one muſcle, which is inſerted by a ſtrong, thick, and roundiſh tendon, into the poſterior half of the tuberoſity which is obſerved at the upper end of the radius. Immediately under this tendon we find a ſmall burſa mucoſa inveſting the tubercle of the radius, and adhering looſely to part of the ſupinator brevis.

The biceps brachii is covered by the faſcia that is derived from the tendons of the pectoralis, deltoides, and other muſcles, and is ſpread over the muſcles of the arm. This faſcia, from which many of the fleſhy fibres of the muſcles take their origin, is found adhering to the two ſides of the lower part of the os humeri (as we obſerved in our deſcription of that bone) by two folds, which many anatomical writers have improperly deſcribed as ligaments, under the names of the *external* and *internal inter-muſcular ligaments.* The firſt of theſe is ſituated at the outer part of the arm, and the latter at the inner part between the brachialis internus and the outer portion of the triceps brachii.

From its inferior extremity, where it begins to grow tendinous, we find the biceps ſending off a broad tendinous expanſion, which unites with that ſent off from the triceps brachii, and is ſpread over all the muſcles on the outſide of the fore-arm.

The principal uſe of this muſcle is to bend the fore-arm. It likewiſe aſſiſts in rolling the radius upon the ulna from within outwards, as in the motion of ſupination.

Brachialis Internus.

THIS muſcle, which is ſituated immediately under the biceps, is of an oblong ſhape, and of conſiderable thickneſs and breadth, intimately adhering to the two inferior thirds of the anterior ſurface of the os humeri.

It ariſes fleſhy from the os humeri, immediately below and at each ſide of the tendon of the deltoides, ſo as to appear forked at its origin. It grows thicker and broader as it deſcends, and narrower again at its inferior extremity, where it terminates in a ſtrong tendon, which, at the anterior ſurface of the muſcle, is nearly two inches in length, and, paſſing obliquely inwards over the capſular ligament of the joint, is inſerted into a ſmall tuberoſity, which we obſerved at the fore part of the coronoid proceſs of the ulna. This tendon ſends off ſome few fibres, which unite with the tendinous faſcia of the biceps.

The uſe of this muſcle is to aſſiſt in bending the fore-arm. Some writers have ſuppoſed that it likewiſe ſerves to draw the capſular ligament of the joint upwards, and thus to prevent it from being pinched; but there does not ſeem to be any good reaſon for this opinion, as its connection with that ligament is only by means of cellular membrane.

Triceps Brachii.

THIS muſcle, which occupies all the poſterior part of the os humeri, is deſcribed as two diſtinct muſcles by Douglas, and as three by Winſlow. The upper part of its long head is covered by the deltoides; the reſt of the muſcle is ſituated immediately under the integuments.

It ariſes, as its name indicates, by three heads. The firſt, or *long* head *, as it is called, ſprings, by a flat tendon of an inch in breadth, from the anterior extremity of the inferior coſta of the ſcapula, near its neck, and below the origin of the teres minor. The ſecond head † ariſes, by an acute tendinous and fleſhy beginning, from the upper and outer part of the os humeri, at the bottom of its great tuberoſity. The third head ‡, which is the ſhorteſt of the three, originates, by an acute fleſhy beginning, from the back part of the os humeri, behind the flat tendon of the latiſſimus dorſi. Theſe three portions unite about the middle of the arm, ſo as to form one thick and powerful muſcle, which adheres to the os humeri to within an inch of the elbow, where it begins to form a broad tendon which, after adhering to the capſular ligament of the elbow, is inſerted into the upper and outer part of the olecranon, and ſends off a great number of fibres, which help to form the faſcia on the outer part of the fore-arm.

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* The long head of the biceps externus. *Douglas.*
Anconeus major. *Winſlow.*

† The ſhort head of the biceps externus. *Douglas.*
Anconeus externus. *Winſlow.*

‡ Brachialis externus. *Douglas.*
Anconeus internus. *Winſlow.*

THE uſe of this muſcle is to extend the fore-arm.

SECTION X.

Of the Muſcles ſituated on the Fore-arm.

THESE muſcles, which are very numerous, are diſpoſed in two layers, one of which is ſituated immediately under the integuments; and when this is removed, we diſcover the ſecond layer. The external one, which is inveſted by the tendinous faſcia already mentioned, conſiſts of the ſupinator longus, extenſor carpi radialis longus, extenſor carpi radialis brevis, extenſor digitorum communis, extenſor minimi digiti, extenſor carpi ulnaris, anconeus, flexor carpi ulnaris, palmaris longus, flexor carpi radialis, pronator teres, and perforatus. Of theſe, the ſeven firſt are ſituated at the outer, and the five laſt at the inner ſurface of the arm. The ſecond layer conſiſts of the ſupinator brevis, abductor pollicis longus, extenſor minor pollicis, extenſor major pollicis, indicator, perforans, flexor longus pollicis, and pronator quadratus. The five firſt are ſituated at the outer, and the three laſt at the inner ſurface of the arm.

Supinator Longus.

THIS is a long and flat muſcle, covered by a very thin tendinous faſcia, and ſituated immediately under the integuments, along the outer convex ſurface of the radius.

It ariſes, by very ſhort tendinous fibres, from the anterior ſurface and outer ridge of the os humeri, about two or three inches above its external condyle, between the brachialis internus and the triceps brachii; and likewiſe from the anterior ſurface of the external intermuſcular membrane, or ligament, as it is called. About the middle of the radius, its fleſhy fibres terminate in a flat tendon, which is inſerted into the inner ſide of the inferior extremity of the radius, near the root of its ſtyloid proceſs.

This muſcle not only aſſiſts in rolling the radius outwards, and turning the palm of the hand upwards, on which account Riolanus firſt gave it the name of *ſupinator*, but it likewiſe aſſiſts in pronation, and in bending the fore-arm.

Extenſor Carpi Radialis Longus.

THIS muſcle, which is ſo called by Douglas, is the *radialis externus longior* of Albinus, and the *radialis externus primùs* of Winſlow. It is almoſt entirely covered by the laſt deſcribed muſcle, which it reſembles in its ſhape and direction.

It ariſes, by a broad, thin, and fleſhy origin, from the inferior part of the outer ridge of the os humeri, above its external condyle, and immediately below the origin of the ſupinator longus. About the middle of the radius, it degenerates into a flat, thin tendon, which becomes ſomewhat thicker and narrower as it deſcends, and, after paſſing under the external annular ligament, ſpreads a little wider again, and is inſerted into the upper part of the metacarpal bone that ſupports the fore-finger.

This muſcle ſerves to extend the wriſt, and to bring the hand backwards.

Extenſor Carpi Radialis Brevis.

THIS muſcle, which is the *radialis externus brevior* of Albinus, and the *radialis externus ſecundus* of Winſlow, is ſituated immediately under the laſt deſcribed muſcle, with which, in ſome ſubjects, it is intimately connected.

It ariſes tendinous from the lower and outer part of the external condyle of the os humeri, and from the upper part of the radius. It continues longer fleſhy, and forms a thicker and a broader tendon than the laſt deſcribed muſcle, with which it paſſes under the ligament of the wriſt, and then ſeparating a little from it, goes to be inſerted into the upper part of the metacarpal bone that ſupports the middle finger.

Its uſe is to aſſiſt the extenſor radialis longus.

Extenſor Digitorum Communis.

THIS is a long muſcle, ſituated immediately under the integuments, along the outer ſurface of the fore-arm, between the extenſor radialis brevis and the extenſor minimi digiti.

It ariſes tendinous, in common with the laſt deſcribed muſcle, from the outer condyle of the os humeri, and, by ſome few fleſhy fibres, from the adjacent tendinous membrane.

brane. It increaſes in ſize as it deſcends, and, about four fingers breadth above the external annular ligament, divides into four fleſhy portions, which form as many roundiſh tendons, that are included in a thin membrane, and paſs altogether under the ligament, to the convex ſurface of the carpus, after which they ſeparate from each other, and become flatter and more expanded. About the extremity of the metacarpal bones, we find them ſending off tendinous filaments to each other, and they are at length inſerted, by a tendinous expanſion, into the back part of all the bones of the fore fingers.

THE uſe of this muſcle is to extend the joints of the fingers.

Extenſor Minimi Digiti.

THIS long and thin muſcle is ſituated immediately under the common integuments, between the extenſor digitorum communis and the extenſor carpi ulnaris. Many writers have conſidered it as a portion of the former, but in general it is ſufficiently diſtinct to deſerve to be deſcribed as a ſeparate muſcle.

It ariſes tendinous, in common with the two laſt deſcribed muſcles, from the outer condyle of the os humeri, and, by ſome few fleſhy fibres, from the tendinous faſcia that covers it. In its deſcent it becomes tendinous ſomewhat ſooner than the extenſor digitorum communis, but its fleſhy fibres do not entirely diſappear till it has reached the external annular ligament, under which its tendon paſſes in an oblique direction, and diſtinct from thoſe of the laſt deſcribed muſcle. When this tendon reaches the metacarpal bone of the little finger, we find it ſending off filaments, which unite with the tendon of the extenſor communis, and the reſt of it is inſerted into the phalanges of the little finger, which this muſcle (as its name indicates) ſerves to extend.

Extenſor Carpi Ulnaris.

THIS, which is the *ulnaris externus* of Winſlow and Albinus, is a long muſcle, like thoſe we have already deſcribed in the preſent ſection, but more conſiderable in bulk.

It ariſes tendinous, in common with the three laſt deſcribed muſcles, from the outer condyle of the os humeri, and fleſhy, as it deſcends, from the outer edge and middle of the ulna. About the middle of the arm its outer edge begins to grow tendinous, but its fleſhy fibres do not entirely diſappear till it has nearly reached the external annular ligament, where it forms a roundiſh tendon, which is incloſed by a membranous ſheath, and paſſes under the ligament, in a groove formed under the extremity of the ulna, and from thence goes to be inſerted into the upper part of the metacarpal bone that ſupports the little finger.

This muſcle aſſiſts the extenſores carpi radiales in extending the wriſt, and bringing the hand backwards.

Anconeus.

THIS muſcle, which is the *anconeus minor* of Winſlow, is ſmall, and of a triangular ſhape. It is ſituated at the outer ſide of the olecranon, immediately under the integuments, along the outer edge and upper part of the laſt deſcribed muſcle.

It ariſes, by a thick ſhort tendon, from the lower and poſterior part of the external condyle of the os humeri. It ſoon becomes fleſhy, and runs downwards, to be inſerted thin and fleſhy into the outer and poſterior edge of the ulna, about two or three inches below the olecranon.

The tendon of this muſcle adheres ſtrongly to the triceps, and, in ſome ſubjects, we find its fibres intermixed, more or leſs, with thoſe of the extenſor carpi ulnaris.

Its uſe is to aſſiſt in extending the fore-arm.

Flexor Carpi Ulnaris.

THIS, which is the *ulnaris internus* of Winſlow and Albinus, is a long muſcle, ſituated at the inner ſide of the fore-arm, immediately under the integuments.

It ariſes tendinous from the inner condyle of the os humeri, and, by a ſmall fleſhy origin, from the anterior edge of the olecranon. Between theſe two portions, we find the ulnar nerve paſſing to the fore-arm. Some of its fibres ariſe likewiſe from the tendinous faſcia that covers the muſcles of the fore-arm. In its deſcent it ſoon becomes tendinous, but its fleſhy fibres do not entirely diſappear till it has reached the lower extremity of the ulna, where its tendon ſpreads a little, and, after ſending off a few fibres to the external and internal annular ligaments, is inſerted into the os piſiforme.

This muſcle aſſiſts in bending the hand.

Palmaris Longus.

THIS is a long thin muſcle, ſituated immediately under the integuments.

It ariſes tendinous from the inner condyle of the os humeri, but ſoon becomes fleſhy, and, after continuing ſo about three inches, terminates in a long ſlender tendon, which, near the wriſt, ſeparates into two portions, one of which is inſerted into the internal annular ligament, and the other loſes itſelf in a tendinous membrane, that is nearly of a triangular ſhape, and extends over the palm of the hand, from the carpal ligament to the roots of the fingers, and is called *aponeuroſis palmaris.* Some of the fibres of this expanſion adhere ſtrongly to the metacarpal bones, and ſeparate the muſcles and tendons of each finger. Several anatomical writers have conſidered this aponeuroſis as a production of the tendon of this muſcle, but ſeemingly without reaſon, becauſe we now and then find the latter wholly inſerted into the carpal ligament, in which caſe it is perfectly diſtinct from the aponeuroſis in queſtion; and, in ſome ſubjects, the palmaris longus is wanting, but the aponeuroſis is always to be found. Rhodius* indeed ſays that the latter is likewiſe now and then deficient, but there is good reaſon to think that he was miſtaken.

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* Mantiſſa Anat. apud T. Bartholin. Hiſt. Anatom. Cent. v. & vi.

This muſcle bends the hand, and may aſſiſt in its pronation; it likewiſe ſerves to ſtretch the aponeuroſis palmaris.

Flexor Carpi Radialis.

THIS, which is the *radialis internus* of Albinus and Winſlow, is a long thin muſcle, ſituated obliquely at the inner and anterior part of the fore-arm, between the palmaris longus and the pronator teres.

It ariſes tendinous from the inner condyle of the os humeri, and, by many fleſhy fibres, from the adjacent tendinous faſcia. It deſcends along the inferior edge of the pronator teres, and terminates in a long, flat, and thin tendon, which afterwards becomes narrower and thicker, and, after paſſing under the internal annular ligament, in a groove diſtinct from the other tendons of the wriſt, it ſpreads wider again, and is inſerted into the fore and upper part of the metacarpal bone that ſuſtains the fore-finger.

This muſcle ſerves to bend the hand, and its oblique direction may likewiſe enable to aſſiſt in its pronation.

Pronator Teres.

THIS is a ſmall muſcle, ſituated at the upper and anterior part of the fore-arm. It is called *teres*, to diſtinguiſh it from the pronator quadratus.

It ariſes, tendinous and fleſhy, from the anterior and inferior part of the outer condyle of the os humeri; and tendinous from the coronoid proceſs of the ulna, near the inſertion of the brachialis internus. The median nerve paſſes between theſe two portions. From theſe origins the muſcle runs obliquely downwards and outwards, and is inſerted, tendinous and fleſhy, into the anterior and convex edge of the radius, about the middle of that bone.

This muſcle, as its name indicates, ſerves to turn the hand inwards.

Perforatus.

THIS muſcle, which is ſo called by Cowper, Douglas, and Winſlow, is by Albinus, and others, named *ſublimis.* It has gotten the name we have adopted, from its tendons being perforated by thoſe of another flexor muſcle of the fingers, called the *perforans.* They who give it the appellation of *ſublimis*, conſider its ſituation with reſpect to the latter, and which, inſtead of *perforans*, they name *profundus.* It is a long muſcle, ſituated moſt commonly at the anterior and inner part of the fore-arm, between the palmaris longus and the flexor carpi ulnaris; but, in ſome ſubjects, we find it placed under the former of theſe muſcles, between the flexor carpi ulnaris and the flexor carpi radialis.

It ariſes, tendinous and fleſhy, from the inner condyle of the os humeri, from the inner edge of the coronoid proceſs of the ulna, and from the upper and fore part of the radius, down to near the inſertion of the pronator teres. A little below the middle of the fore-arm we find its fleſhy belly dividing into four portions, which degenerate into as many round tendons, that paſs all together under the internal annular ligament of the wriſt, after which they ſeparate from each other, become thinner and flatter, and running along the palm of the hand, under the aponeuroſis palmaris, are inſerted into the upper part of the ſecond bone of each finger. Previous to this inſertion, however, we find the fibres of each tendon decuſſating near the extremity of the firſt bone, ſo as to afford a paſſage to a tendon of the perforans. Of theſe four tendons, that of the middle-finger is the largeſt, that of the fore-finger the next in ſize, and that of the little-finger the ſmalleſt.

The uſe of this muſcle is to bend the ſecond joint of the fingers.

Supinator Brevis.

THIS ſmall muſcle, which is tendinous externally, is ſituated at the upper part of the fore-arm under the ſupinator longus, the extenſor carpi radialis brevis, the extenſor carpi ulnaris, the extenſor digitorum communis, and the extenſor minimi digiti.

It ariſes tendinous from the lower and anterior part of the outer condyle of the os humeri, and tendinous and fleſhy from the outer edge and poſterior ſurface of the ulna, adhering firmly to the ligament that joins the radius to that bone. From theſe origins its fibres deſcend forwards and inwards, and are inſerted into the upper, inner, and anterior part of the radius around the cartilaginous ſurface upon which ſlides the tendon of the biceps, and likewiſe into a ridge that runs downwards and outwards below this ſurface.

This muſcle aſſiſts in the ſupination of the hand by rolling the radius outwards.

Abductor Pollicis Longus.

THIS muſcle, which is the *extenſor primi internodii* of Douglas, is deeply ſeated on the outer ſurface of the fore-arm, in an oblique direction, and is in part covered by the extenſor carpi radialis brevis, the extenſor digitorum communis, the extenſor minimi digiti, and the extenſor carpi ulnaris.

It ariſes tendinous and fleſhy from the middle and poſterior part of the ulna, immediately below the termination of the anconeus muſcle, from the poſterior ſurface of the interoſſeous ligament, and from the back part of the middle of the radius, towards the lower part of the fore-arm it divides into two, and ſometimes three diſtinct portions, that terminate in as many tendons, which paſs under the external annular ligament of the wriſt, and are inſerted into the os trapezium, and upper back part of the firſt bone of the thumb.

The uſe of this muſcle is to extend the firſt bone of the thumb outwardly.

Extenſor Minor Pollicis.

THIS is the *extenſor ſecundi internodii* of Douglas. Winſlow conſiders it and the preceding muſcle as one, to which he gives the name of *extenſor pollicis primus*. It is ſituated along the inferior edge of the laſt deſcribed muſcle, and reſembles it in its ſhape and extent.

It ariſes tendinous and fleſhy, from the poſterior part of the ulna, immediately below the origin of the abductor pollicis longus; and likewiſe from the interoſſeous ligament and the adjacent part of the radius. It terminates in a tendon, which paſſes under the external annular ligament of the wriſt, uſually in the ſame groove with the tendons of the laſt deſcribed muſcle, and is inſerted into the convex and upper part of the ſecond bone of the thumb.

Its uſe is to extend the ſecond bone of the thumb obliquely outwards.

Extenſor Major Pollicis.

DOUGLAS calls this the *extenſor tertii internodii*, and Winſlow the *extenſor pollicis ſecundus*. Its ſhape and ſituation are ſimilar to thoſe of the laſt deſcribed muſcle, but it is longer and ſomewhat thicker.

It ariſes tendinous and fleſhy from the back of the ulna, and from the interoſſeous ligament, a little below the origin of the abductor pollicis longus. Its tendon paſſes under the external annular ligament, through a ſmall groove at the inner and poſterior part of the lower end of the radius, and is inſerted into the third and laſt bone of the thumb.

This muſcle ſerves to extend the laſt joint of the thumb obliquely backwards.

Indicator.

THIS muſcle is the *extenſor ſecundi internodii indicis proprius*, vulgo *indicator*, of Douglas, and the *extenſor indicis proprius* of Winſlow. It reſembles the two laſt deſcribed muſcles in its ſhape, and is in part covered by the extenſor digitorum communis, and the extenſor minimi digiti.

It ariſes fleſhy from the middle of the ulna, immediately below the origin of the extenſores pollicis. Its tendon paſſes under the external annular ligament of the wriſt, along with thoſe of the extenſor digitorum communis, and from thence running along the convex ſurface of the hand, we find it uniting at the lower end of the metacarpal bone of the fore-finger, with the tendon of the extenſor communis that goes to that finger, into the poſterior part of which they are inſerted together.

The uſe of this muſcle is to aſſiſt in extending the fore-finger.

Perforans.

IN ſpeaking of the perforatus, I explained why this muſcle is by ſome writers called *perforans*, and by others *profundus*. It is ſituated immediately under the perforatus, which it greatly reſembles in its ſhape.

It ariſes fleſhy from the upper part and inner ſurface of the ulna, and likewiſe from the interoſſeous ligament, as far down as the upper edge of the pronator quadratus. A little before it paſſes under the internal annular ligament of the wriſt, it divides into four tendons, which run through the ſlits we deſcribed in the perforatus, and are inſerted into the anterior and upper part of the laſt bone of each finger.

The uſe of this muſcle is to bend the laſt joint of the finger.

Flexor Longus Pollicis.

This muſcle, which is ſo named by Winſlow and Albinus, is the *flexor tertii internodii* of Douglas. It is placed at the ſide of the laſt deſcribed muſcle, and is covered by the extenſores carpi radiales.

It ariſes fleſhy from the anterior ſurface of the radius immediately below the inſertion of the biceps, and is continued down along the oblique ridge, which ſerves for the inſertion of the ſupinator brevis, as far as the pronator quadratus. Some of its fibres ſpring likewiſe from the neighbouring edge of the interoſſeous ligament. Its tendon paſſes under the internal annular ligament of the wriſt, and after running along the inner ſurface of the firſt bone of the thumb, between the two portions of the flexor brevis pollicis, goes to be inſerted into the laſt joint of the thumb, being bound down in its way by the ligamentous expanſion that is ſpread over the ſecond bone.

In ſome ſubjects we find a tendinous portion ariſing from the inner condyle of the os humeri, and forming a fleſhy ſlip that commonly terminates near the upper part of the origin of this muſcle from the radius; Lieutaud * has ſeen it forming a diſtinct muſcle, which was inſerted by a conſiderable tendon into the bones of the carpus.

The uſe of this muſcle is to bend the laſt joint of the thumb.

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* Anatom. Hiſt. & Pratique, tome i.

Pronator Quadratus.

THIS, which has gotten its name from its uſe and its ſhape, is a ſmall fleſhy muſcle, ſituated at the lower and inner part of the fore-arm, and covered by the tendons of the flexor muſcles of the hand.

It ariſes tendinous and fleſhy from the lower and inner part of the ulna, and runs nearly in a tranſverſe direction, to be inſerted into that part of the radius which is oppoſite to its origin, its inner fibres adhering to the interoſſeous ligament.

This muſcle aſſiſts in the pronation of the hand, by turning the radius inwards.

SECTION XI.

Of the Muſcles ſituated on the Hand.

THESE ſmall muſcles are in no inconſiderable number. The *interoſſei externi*, which I ſhall deſcribe the laſt, are ſituated on the outſide of the hand. All the others are placed on the inſide.

Lumbricales.

THESE little muſcles which are four in number, are placed in the hollow of the hand, under the aponeuroſis palmaris, and the tendons of the perforatus. They have gotten their name from their ſuppoſed reſemblance to the common earth-worm, *(lumbricus.)*

THEY ariſe thin and fleſhy from the tendons of the perforans, a little below the internal annular ligament, and terminate each in a long ſlender tendon. Theſe tendons run over the articulation of the firſt bone of the fingers with thoſe of the metacarpus, and ſpreading over the convex ſurface of this phalanx, loſe themſelves in the tendons of the extenſor digitorum communis.

THE firſt of theſe muſcles, or that which is inſerted into the fore finger, is commonly the thickeſt of the four. It ariſes from the anterior and lateral part of that tendon of the perforans which is next to the thumb. The other three ariſe each from two tendons. In their way to the back part of the fingers, they commonly run over that ſide of the articulation which is towards the thumb, but in ſome ſubjects we find their tendons paſſing over the ſide next to the little finger. Theſe muſcles ſeem to have two very oppoſite uſes, for by being inſerted into the firſt joint of each finger, they ſerve to bend that joint, and from their connection with the extenſor communis, they may aſſiſt in extending the two laſt joints of the fingers. This remark was firſt made by Fallopius *.

Abductor Brevis Pollicis.

THIS, which Douglas calls ſimply *abductor*, is a ſmall muſcle ſituated immediately under the integuments, and forms the fleſhy prominence in the palm of the hand, and on the thumb.

It ariſes by a broad, tendinous and fleſhy origin, from the anterior ſurface of part of the internal annular ligament, from the os ſcaphoides, and likewiſe from one of the tendons of the abductor longus pollicis. It is inſerted by a ſtrong flat tendon into the outer ſide of the root of the ſecond bone of the thumb.

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* Obſerv. Anatomic.

THIS muſcle ſerves to draw the thumb from the fingers.

Opponens Pollicis.

THIS muſcle, which is the *flexor primi internodii* of Douglas, is ſituated under the laſt deſcribed muſcle, which it reſembles in its ſhape.

IT ariſes tendinous and fleſhy from the os ſcaphoïdes, and from the anterior and inner ſurface of the internal annular ligament. It is inſerted tendinous and fleſhy into the under and anterior part of the firſt bone of the thumb.

THIS muſcle ſerves to turn the firſt bone of the thumb upon its axis, and at the ſame time to bring it inwards oppoſite to the other fingers.

Flexor Brevis Pollicis.

THIS muſcle, which is the *flexor ſecundi internodii* of Douglas, and the *thenar* of Winſlow, is divided into two portions by the tendon of the flexor pollicis longus. The outermoſt portion ariſes tendinous from the anterior part of the os trapezoides, and internal annular ligament, adhering ſtrongly to the edge of the laſt deſcribed muſcle. The ſecond, or innermoſt and thickeſt portion ariſes from the ſame bone, and likewiſe from the os magnum and os unciforme. Both theſe portions are inſerted tendinous into the oſſa ſeſamoidea and ſecond bone of the thumb.

The uſe of this muſcle is to bend the ſecond joint of the thumb.

Adductor Pollicis.

THIS muſcle, which is the *adductor ad minimum digitum* of Douglas, and the *meſothenar* of Winſlow, is ſmall and flat, and nearly of a triangular ſhape.

It ariſes tendinous and fleſhy, from almoſt the whole length of the metacarpal bone of the middle finger, and its fibres, being collected together, terminate in a flat tendon which is inſerted into the inner part of the baſis of the ſecond bone of the thumb.

The uſe of this muſcle is to draw the thumb towards the finger.

Abductor Indicis.

THIS little muſcle is the *adductor ad indicem* of Douglas, and the *antithenar*, or *ſemi-interoſſeus pollicis* of Winſlow.

It ariſes from the os trapezium, and from the upper part and inner ſide of the firſt bone of the thumb, and is inſerted by a ſhort tendon into the back part of the firſt bone of the fore-finger on the ſide next to the thumb.

This muſcle ſerves to draw the fore-finger towards the thumb.

Palmaris Brevis.

This is a ſmall thin cutaneous muſcle, ſituated between the wriſt and the little-finger. Fallopius tells us, that it was diſcovered by Cananus. Winſlow names it *palmaris cutaneus.*

It ariſes from a ſmall part of the internal annular ligament, and inner edge of the aponeuroſis palmaris, and is inſerted by ſmall bundles of fleſhy fibres into the os piſiforme, and into the ſkin and fat that cover the abductor minimi digiti.

This muſcle ſeems to aſſiſt in contracting the palm of the hand.

Abductor Minimi Digiti.

THIS, which is the *extenſor tertii internodii minimi digiti* of Douglas, and the *hypothenar minor* of Winſlow, is a thin fleſhy muſcle, which helps to form the prominence at the inner edge of the palm of the hand.

It ariſes fleſhy from the inner ſurface and inferior edge of the os piſiforme, and from the adjacent part of the internal annular ligament; and is inſerted by a flat tendon into the firſt bone of the little-finger laterally.

Flexor Parvus Minimi Digiti.

THIS muſcle, which is the *abductor minimi digiti* of Douglas, is ſituated along the inner ſurface of the metacarpal bone of the little finger.

It ariſes tendinous and fleſhy from all that proceſs of the os unciforme, from which that bone has gotten its name; and likewiſe from the anterior ſurface of the adjacent part of the internal annular ligament. It terminates in a flat tendon, which is connected with that of the laſt deſcribed muſcle, and inſerted into the inner and anterior part of the upper end of the firſt bone of the little finger.

This muſcle ſerves to bend the little finger, and likewiſe to aſſiſt the abductor.

Adductor Metacarpi Minimi Digiti.

THIS, which is the *flexor primi internodii minimi digiti* of Douglas, and the *metacarpus* of Winſlow, is a ſmall fleſhy muſcle nearly of a triangular ſhape, and ſituated under the abductor and flexor brevis.

It ariſes tendinous and fleſhy from the ſame proceſs as the laſt deſcribed muſcle, and likewiſe from the anterior ſurface, and inferior edge of the adjacent part of the internal annular ligament. It is inſerted tendinous into the anterior part and inner ſide of the metacarpal bone of the little-finger.

This muſcle ſerves to draw the metacarpal bone of this finger towards the reſt; it likewiſe aſſiſts in making the palm of the hand hollow, ſo as to form what is called *Diogenes's cup.*

Interoſſei.

THESE are ſmall muſcles ſituated between the metacarpal bones, and extending from the bones of the carpus to the fingers. They are divided into *internal* and *external*; the former are to be ſeen only on the palm of the hand, but the latter are conſpicuous both on the palm and back of the hand.

The *interoſſei interni* are three in number. The firſt, which Albinus names *poſterior indicis*, ariſes tendinous and fleſhy from the baſis and inner part of the metacarpal bone of the fore-finger, and likewiſe from the upper part of that which ſupports the middle-finger. Its tendon paſſes over the articulation of this part of theſe bones with the fore-finger, and uniting with the tendinous expanſion that is ſent off from the extenſor digitorum communis, is inſerted into the poſterior convex ſurface of the firſt phalanx of that finger.

The ſecond and third, to which Albinus gives the names of *prior annularis*, and *inter-*

oſſeus auricularis, ariſe, in the ſame manner, from the baſes of the outſides of the metacarpal bones that ſuſtain the ring-finger and the little finger, and are inſerted into the outſide of the tendinous expanſion of the extenſor digitorum communis that covers each of thoſe fingers.

These three muſcles draw the fingers, into which they are inſerted, towards the thumb.

The *interoſſei externi* are four in number, for among theſe I include the ſmall muſcle that is ſituated on the outſide of the metacarpal bone that ſupports the fore-finger. Douglas calls it *extenſor tertii internodii indicis*, and Winſlow *ſemi-interoſſeus indicis*. Albinus, who deſcribes it among the interoſſei, gives it the name of *prior indicis*. This firſt interoſſeus externus ariſes by two tendinous and fleſhy portions. One of theſe ſprings from the upper half of the inner ſide of the firſt bone of the thumb, and the other from the ligaments that unite the os trapezoides to the metacarpal bone of the fore-finger, and likewiſe from all the outſide of this latter bone. Theſe two portions unite as they deſcend, and terminate in a tendon, which is inſerted into the outſide of that part of the tendinous expanſion from the extenſor digitorum communis that is ſpread over the poſterior convex ſurface of the fore-finger.

The ſecond, to which Albinus gives the name of *prior medii*, is not quite ſo thick as the laſt deſcribed muſcle. It ariſes by two heads, one of which ſprings from the inner ſide of the metacarpal bone of the fore-finger, chiefly towards its convex ſurface, and the other ariſes from the adjacent ligaments, and from the whole outer ſide of the metacarpal bone that ſuſtains the middle-finger. Theſe two portions unite as they deſcend, and terminate in a tendon, which is inſerted, in the ſame manner as the preceding muſcle, into the outſide of the tendinous expanſion that covers the poſterior part of the middle-finger.

The third belongs likewiſe to the middle-finger, and is therefore named *poſterior medii* by Albinus. It ariſes, like the laſt deſcribed muſcle, by two origins, which ſpring from the roots of the metacarpal bones of the ring and middle-fingers, and from the adjacent ligaments, and is inſerted into the inſide of the ſame tendinous expanſion as the preceding muſcle.

The fourth, to which Albinus gives the name of *poſterior annularis*, differs from the two laſt only in its ſituation, which is between the metacarpal bones of the ring and little fingers. It is inſerted into the inſide of the tendinous expanſion of the extenſor digitorum communis that covers the poſterior part of the ring-finger.

All theſe four muſcles ſerve to extend the fingers into which they are inſerted, and likewiſe to draw them inwards, towards the thumb, except the third, or *poſterior medii*, which, from its ſituation and inſertion, is calculated to pull the middle-finger outwards.

SECTION XII.

Of the Muſcles ſituated on the poſterior part of the Pelvis and upper part of the Thigh.

THESE muſcles, which help to form the buttock on each ſide, are diſpoſed in three layers. The firſt layer conſiſts of the glutæus maximus, the ſecond of the glutæus medius, and the third of the glutæus minimus, the pyriformis, the gemini, part of the obturator internus, and the quadratus femoris.

Glutæus * *Maximus.*

THIS broad radiated muſcle, which is divided into a number of ſtrong faſciculi, is covered by a pretty thick aponeuroſis derived from the *faſcia lata*, and is ſituated immediately under the integuments.

It ariſes fleſhy from the outer lip of ſomewhat more than the poſterior half of the ſpine of the ilium, from the ligaments that cover the two poſterior ſpinous proceſſes; from the poſterior ſacro-iſchiatic ligament; and from the outer ſides of the os ſacrum and os coccygis. From theſe origins the fibres of the muſcle run towards the great trochanter of the os femoris, where they form a broad and thick tendon, between which and the trochanter we find a conſiderable *burſa mucoſa.* This tendon is inſerted into the upper part of the *linea aſpera*, for the ſpace of two or three inches downwards; and ſends off fibres to the faſcia lata, and to the upper extremity of the vaſtus externus.

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* From γλȣτὸς, *nates.*

THIS muſcle ſerves to extend the thigh, by pulling it directly backwards; at the ſame time it draws it a little outwards, and thus aſſiſts in its rotatory motion. Its origin from the coccyx ſeems to prevent that bone from being forced too far backwards.

Glutæus Medius.

THE poſterior half of this muſcle is covered by the glutæus maximus, which it greatly reſembles in its ſhape; but the anterior and upper part of it is covered only by the integuments, and by a tendinous membrane which belongs to the faſcia lata.

It ariſes fleſhy from the outer lip of the anterior part of the ſpine of the ilium, from part of the poſterior ſurface of that bone, and likewiſe from the faſcia that covers it. From theſe origins its fibres run towards the great trochanter, into the outer and poſterior part of which it is inſerted by a broad tendon. Between this tendon and the trochanter we find a ſmall thin *burſa mucoſa.*

The uſes of this muſcle are nearly the ſame as thoſe of the glutæus maximus; but it is not confined, like that muſcle, to rolling the os femoris outwards, its anterior portion being capable of turning that bone a little inwards. As it has no origin from the coccyx, it can have no effect on that bone.

Glutæus Minimus.

THIS, which is likewiſe a radiated muſcle, is ſituated under the glutæus medius.

In adults, and eſpecially in old ſubjects, its outer ſurface is uſually tendinous.

It ariſes fleſhy between the two ſemicircular ridges we obſerve on the outer ſurface of the ilium, and likewiſe from the edge of its great niche. Its fibres run in different directions towards a thick flat tendon, which adheres to the capſular ligament of the joint, and is inſerted into the fore and upper part of the great trochanter. A ſmall *burſa mucoſa* may be obſerved between the tendon of this muſcle and the trochanter.

This muſcle aſſiſts the two former in drawing the thigh backwards and outwards, and in rolling it. It may likewiſe ſerve to prevent the capſular ligament from being pinched in the motions of the joint.

Pyriformis.

SPIGELIUS was the firſt who gave a name to this muſcle, which he called *pyriformis*, from its ſuppoſed reſemblance to a pear. It is a ſmall radiated muſcle, ſituated under the glutæus maximus, along the inferior edge of the glutæus minimus.

It ariſes by three, and ſometimes four tendinous and fleſhy origins, from the anterior ſurface of the ſecond, third, and fourth pieces of the os ſacrum, ſo that this part of it is within the pelvis. From theſe origins the muſcle grows narrower, and paſſing out of the pelvis, below the niche in the poſterior part of the ilium, from which it receives a few fleſhy fibres, is inſerted, by a roundiſh tendon of an inch in length, into the upper part of the cavity at the root of the trochanter major.

The uſe of this muſcle is to aſſiſt in rolling the thigh outwards, and in moving it a little upwards.

Gemini.

THIS muſcle has been a ſubject of diſpute among anatomiſts ſince the days of Veſalius. Some deſcribe it as two diſtinct muſcles, and hence the name it has gotten of *gemini.* Others contend that it ought to be conſidered as a ſingle muſcle. The truth is, that it conſiſts of two portions, which are united to-

together by a tendinous and fleſhy membrane, and afford a paſſage between them to the tendon of the obturator internus, which they incloſe as it were in a purſe. Theſe two portions are placed under the glutæus maximus, between the iſchium and the great trochanter.

The ſuperior portion, which is the ſhorteſt and thickeſt of the two, ariſes fleſhy from the external ſurface of the ſpine of the iſchium; and the inferior, from the tuberoſity of that bone, and likewiſe from the poſterior ſacro-iſchiatic ligament. They are inſerted, tendinous and fleſhy, into the cavity at the root of the great trochanter. Between the two portions of this muſcle, and the termination of the obturator internus, we find a ſmall *burſa mucoſa*, connected to both, and to that part of the capſula of the joint which lies under the gemini.

This muſcle aſſiſts in rolling the os femoris outwards, and prevents the tendon of the obturator internus from ſlipping out of its place while that muſcle is in action.

Obturator Internus.

THIS is a conſiderable muſcle, a great part of which is ſituated within the pelvis.

It ariſes, by very ſhort tendinous fibres, from ſomewhat more than the upper half of the internal circumference of the foramen thyroideum of the os innominatum. It is compoſed of ſeveral diſtinct faſciculi, which terminate in a roundiſh tendon that paſſes out of the pelvis, through the niche that is between the ſpine and the tuberoſity of the iſchium, and, after running between the two portions of the gemini in the manner juſt now deſcribed, is inſerted into the cavity at the root of the great trochanter, after adhering to the adjacent part of the capſular ligament of the joint.

This muſcle rolls the os femoris obliquely outwards, by pulling it towards the iſchiatic niche, upon the cartilaginous ſurface of which its tendon, which is ſurrounded by a membranous ſheath, moves as upon a pulley.

Quadratus Femoris.

THIS is a flat, thin, and fleſhy muſcle, but not of the ſhape its name would ſeem to indicate. It is ſituated immediately below the gemini.

It ariſes tendinous and fleſhy from the external ſurface and lower edge of the tuberoſity of the iſchium, and is inſerted by ſhort tendinous fibres into a ridge which we ſee extending from the baſis of the trochanter major to that of the trochanter minor.

Its uſe is to bring the os femoris outwards.

SECTION XIII.

Of the Muſcles ſituated on the Thigh.

THESE are the biceps cruris, ſemi-tendinoſus, ſemi-membranoſus, tenſor vaginæ femoris, ſartorius, rectus, gracilis, vaſtus externus, vaſtus internus, cruralis, pectinalis, adductor longus, adductor brevis, adductor magnus, and obturator externus. Of theſe, the three firſt are ſituated at the back part; the fourth, or tenſor vaginæ femoris, on the outſide; and the reſt on the anterior and inner parts of the thigh.

Immediately under the integuments we find a broad tendinous membrane, called the *faſcia lata*, which is ſent off from the back, and from the tendons of the glutæi and other muſcles, and is ſpread over all the muſcles of the thigh and leg in the manner of a ſheath. It adheres above to the outer lip of the os innominatum, and communicates, as we have ſeen, with the tendon of the obliquus externus abdominis. We likewiſe ſee it dipping down between the muſcles, and adhering to the linea aſpera; lower down it ſpreads itſelf over the joint of the knee, and from thence paſſes on to the leg.

On the outſide of the thigh this faſcia is of great ſtrength and thickneſs, but at the poſterior and anterior parts it becomes thinner, and at the inſide of the thigh has rather the appearance of cellular ſubſtance than of a tendinous faſcia.

Biceps Cruris.

THIS muſcle is ſituated immediately under the integuments at the back part of the thigh.

It ariſes, as its name indicates, by two heads, which afterwards unite to form one muſcle. The firſt and longeſt of theſe heads begins tendinous, in common with the ſemitendinoſus, from the outer, inferior, and poſterior part of the tuberoſity of the iſchium, and deſcends obliquely outwards, degenerating into a ſtrong and broad tendon a little below the middle of the thigh. The ſecond head ariſes, by an acute tendinous and fleſhy origin, from the linea aſpera, a little below the termination of the glutæus maximus. It becomes broader as it deſcends, and receives ſome of its fibres from the adjacent faſcia lata. It unites with the other portion a little above the external condyle of the os femoris, to form a thick tendon, which makes what is called the *outer hamſtring*, and is inſerted into the upper and back part of the fibula. We find a *burſa mucoſa* between this tendon and the capſular ligament of the knee.

The principal uſe of this muſcle is to bend the leg.

Semi-tendinoſus.

THIS muſcle, which is the *ſemi-nervoſus* of Douglas and Winſlow, is ſituated obliquely along the back part of the thigh.

It ariſes, tendinous and fleſhy, from the inferior, poſterior, and outer part of the tuberoſity of the iſchium, in common with the long head of the laſt deſcribed muſcle, to the poſterior edge of which it continues to adhere, by a great number of oblique fibres, for the ſpace of two or three inches. Towards the lower part of the os femoris it terminates in a round tendon, which paſſes behind the inner condyle of the thigh bone, and becoming flat, is inſerted into the upper and inner part of the ridge of the tibia, a little below its tuberoſity.

This tendon ſends off an aponeuroſis, which helps to form the tendinous faſcia that covers the muſcles of the leg.

This muſcle aſſiſts in bending the leg, and at the ſame time draws it a little inwards.

Semi-membranoſus.

THIS, which is placed next to the laſt deſcribed muſcle, ariſes from the outer ſurface of the tuberoſity of the iſchium, by a broad flat tendon which is three inches in length. From this tendon it has gotten the name of ſemi-membranoſus. It then begins to grow fleſhy, and runs at firſt under the long head of the biceps, and afterwards between that muſcle and the ſemi-tendinoſus. At the lower part of the thigh it becomes narrower again, and terminates in a ſhort tendon, which is inſerted chiefly into the upper and back part of the head of the tibia, but ſome of its fibres are ſpread over the poſterior ſurface of the capſular ligament of the knee. Between this capſular ligament and the tendon of the muſcle, we find a ſmall *burſa mucoſa.*

THE tendons of this and the laſt deſcribed muſcle form the *inner ham-ſtring.*

THIS muſcle bends the leg, and ſeems likewiſe to prevent the capſular ligament from being pinched.

Tenſor Vaginæ Femoris.

THIS muſcle, which is ſo named by Albinus from its ſtretching the tendinous ſheath that ſurrounds the muſcles of the thigh, is the *membranoſus* of Douglas, and the *muſculus faſciæ latæ* of Winſlow. It is ſituated at the upper and outer part of the thigh.

IT ariſes, by a narrow tendinous beginning, from the inferior and outer part of the anterior and ſuperior ſpinous proceſs of the ilium. It ſoon becomes fleſhy, and of greater breadth and thickneſs, deſcending obliquely outwards and backwards towards the great trochanter, a little below which we find it terminating in the inner ſide of the *faſcia lata.*

Its chief uſe ſeems to be to ſtretch this faſcia. It may likewiſe aſſiſt in rolling the thigh inwards.

Sartorius.

THIS flat and ſlender muſcle, which is the longeſt of the human body, and from an inch and a half to two inches in breadth, is ſituated immediately under the integuments, and extends obliquely from the upper and anterior part of the thigh to the upper, anterior, and inner part of the tibia, being incloſed by a thin membranous ſheath, which is derived from the adjacent *faſcia lata.*

It ariſes, by a tendon of about half an inch in breadth, from the outer ſurface and inferior edge of the anterior ſuperior ſpinous proceſs of the ilium, but ſoon becomes fleſhy, and runs down a little way obliquely inwards, and then for ſome ſpace upon the rectus, nearly in a ſtrait direction; after which it paſſes obliquely over the vaſtus internus, and the lower part of the adductor longus, and then running down between the tendons of the adductor magnus and the gracilis, is inſerted, by a thin tendon, into the inner part of the tibia, near the inferior part of its tuberoſity, and for the ſpace of an inch or two below it. This tendon ſends off a thin aponeuroſis, which is ſpread over the upper and poſterior part of the leg.

THIS muſcle ſerves to bend the leg obliquely inwards, or to roll the thigh outwards, and at the ſame time to bring one leg acroſs the other, on which account Spigelius firſt gave it the name of *ſartorius*, or the taylor's muſcle.

Rectus.

THIS muſcle is ſituated immediately at the fore part of the thigh. It ariſes from the os ilium by two tendons. The foremoſt and ſhorteſt of theſe ſprings from the outer ſurface of the inferior and anterior ſpinous proceſs of the ilium; the poſterior tendon, which is thicker and longer than the other, ariſes from the poſterior and outer part of the edge of the cotyloid cavity, and from the adjacent capſular ligament. Theſe two tendons ſoon unite, and form an aponeuroſis, which ſpreads over the anterior ſurface of the upper part of the muſcle; and through its whole length we obſerve a middle tendon, towards which its fleſhy fibres run on each ſide in an oblique direction, ſo that it may be ſtyled a penniform muſcle. It is inſerted tendinous into the upper edge and anterior ſurface of the patella, and from thence ſends off a thin aponeuroſis, which adheres to the ſuperior and lateral part of the tibia.

Its uſe is to extend the leg.

Gracilis.

THIS long, ſtraight, and ſlender muſcle, which Winſlow names *gracilis* ſive *rectus internus*,

ternus, is ſituated immediately under the integuments at the inner part of the thigh.

It ariſes, by a broad and thin tendon, from the anterior part of the iſchium and pubis, and ſoon becoming fleſhy, deſcends nearly in a ſtrait direction along the inſide of the thigh. A little above the knee it terminates in a ſlender and roundiſh tendon, which afterwards becomes flatter, and is inſerted into the inſide of the tibia behind and under the ſartorius.

Under the tendons of this and the rectus we find a conſiderable *burſa mucoſa*, which, on one ſide, adheres to them and to the tendon of the ſemi tendinoſus, and on the other, to the capſular ligament of the knee.

This muſcle aſſiſts in bending the thigh and leg inwards.

Vaſtus Externus.

THIS large, thick, and fleſhy muſcle is ſituated at the outer ſide of the thigh. It ariſes, by a broad thick tendon, from the lower and anterior part of the great trochanter, and upper part of the linea aſpera; it likewiſe adheres, by fleſhy fibres, to the whole outer edge of that rough line. Its fibres deſcend obliquely forwards, and after it has run four or five inches downwards, we find it adhering to the anterior ſurface and outer ſide of the cruræus, with which it continues to be connected to the lower part of the thigh, where we ſee it terminating in a broad tendon, which is inſerted into the upper part of the patella laterally, and ſends off an aponeuroſis that adheres to the head of the tibia, and is continued down the leg.

Vaſtus internus.

This muſcle, which is leſs conſiderable than the vaſtus externus, is ſituated at the inner ſide of the thigh, being ſeparated from the laſt deſcribed muſcle by the rectus.

It ariſes tendinous and fleſhy from between the fore-part of the os femoris, and the root of the leſſer trochanter, below the inſertion of the pſoas magnus, and the iliacus internus; and from all the inner ſide of the linea aſpera. Like the vaſtus externus it is connected with the cruræus, but it continues longer fleſhy than that muſcle. A little above the knee we ſee its outer edge uniting with the inner edge of the rectus, after which it is inſerted tendinous into the upper part and inner ſide of the patella, ſending off an aponeuroſis which adheres to the upper part of the tibia.

Cruræus.

THIS muſcle is ſituated under the rectus, between the two vaſti.

It ariſes fleſhy from the fore and outer part of the trochanter minor of the os femoris, and adheres to the whole anterior ſurface of that bone to within two inches of its inferior extremity. It is connected with both vaſti, unites with the tendon of the rectus, and is inſerted behind it into the upper part of the patella, between which and the tendons of this and the two laſt deſcribed muſcles, there is a thin but large *burſa mucoſa.*

IMMEDIATELY under the cruræus, in ſome ſubjects, we find two little muſcles which ariſe from the anterior ſurface of the os femoris, two or three inches above the capſular ligament of the knee-joint, into which they are inſerted on each ſide of the patella. When theſe *ſub cruræi* muſcles are wanting, ſome of the fibres of the cruræus are ſpread over the capſula. Albinus has deſcribed them, but M. Portal * obſerves that they were firſt noticed by Dupré, a ſurgeon at Paris, in 1699. Their uſe is to prevent the ligament from being pinched in the extenſion of the joint.

THE cruræus, and the two vaſti, have all of them the ſame uſe; viz. that of extending the leg. From the manner in which they are connected to each other, ſome anatomiſts, and particularly Albinus, have been induced to conſider them as a *triceps*, or ſingle muſcle with three origins.

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* Hiſt. d' Anatomie, tome iv.

Pectinalis.

THIS is a ſmall flat muſcle, ſituated obliquely between the pubis and the little trochanter, at the upper and anterior part of the thigh.

It ariſes broad and fleſhy from all the anterior edge of the os pectinis, or pubis, as it is more commonly called, as far as its ſpine, and deſcending obliquely backwards and outwards, is inſerted by a ſhort and broad tendon, into the upper and anterior part of the linea aſpera of the os femoris a little below the leſſer trochanter.

This muſcle ſerves to bend the thigh, by drawing it upwards and inwards, and likewiſe aſſiſts in rolling it outwards.

Adductor Longus Femoris.

THIS and the two following muſcles were long conſidered as forming a ſingle muſcle, which was therefore called *triceps femoris.* The impropriety of this arrangement has long been acknowleged, but neither Winſlow, Albinus, or Douglas have ventured to deviate ſo far from cuſtom as to drop this appellation, although they were convinced that it conſiſts of diſtinct muſcles. Accordingly, we find them retaining the general name of *triceps*, and giving ſeparate names to the portions into which they divide it. I have thought it right to lay aſide the former, and in regard to the latter I ſhall adopt thoſe uſed by Albinus, becauſe Douglas has unneceſſarily conſidered the laſt of the three as two muſcles.

THE adductor longus, which is the *adductor primus* of Douglas, and the *triceps primus* of Winſlow, is a fleſhy muſcle, ſituated obliquely at the upper and inner part of the thigh, on the inner ſide of the pectinalis.

It ariſes by a thick roundiſh tendon from the upper and anterior part of the os pubis, and becoming broad and fleſhy, deſcends obliquely outwards and backwards, and is inſerted by a broad and ſhort tendon near the middle of the poſterior part of the linea aſpera, being continued two or three inches downwards. From the lower part of this tendon ſome fibres are detached, which join that of the adductor magnus.

The uſes of this muſcle are ſimilar to thoſe of the pectinalis.

Adductor Brevis Femoris.

THIS, which is the *adductor ſecundus* of Douglas, and the *triceps ſecundus* of Winſlow, is, in a great meaſure, covered by the pectinalis, and the laſt deſcribed muſcle, the latter of which it greatly reſembles in its poſition and ſhape.

It ariſes by ſhort tendinous fibres from the anterior ſurface of the ramus of the os pubis, below and behind the origin of the adductor longus, and is inſerted into the upper and inner part of the linea aſpera, from a little below the leſſer trochanter to the beginning of the inſertion of the laſt deſcribed muſcle.

The uſes of this muſcle are nearly the ſame as thoſe of the adductor longus; but it ſeems to be leſs powerful as a flexor of the thigh, and more calculated to draw it inwards.

Adductor Magnus Femoris.

THIS is the *triceps tertius* of Winſlow, and includes the *adductor tertius* and *adductor quartus* of Douglas. It is much larger than either of the two laſt deſcribed muſcles, behind which it is ſituated, but has nearly the ſame ſhape and direction.

It ariſes, by a ſhort thick tendon, from the anterior ſurface of the lower part of the branch of the os pubis, a little below the origin of the adductor brevis; and tendinous and fleſhy from the ramus iſchii, including the tuberoſity of that bone, where ſome of its fibres intermix with the upper extremity of the ſemi membranoſus. Its fibres run downwards and outwards, and are inſerted tendinous into the whole length of the linea aſpera, and into the ridge that extends to the inner condyle of the os femoris; it there forms a roundiſh tendon, which adheres to the upper and poſterior part of that condyle. A little above this we find the femoral artery paſſing between this muſcle and the bone, taking a ſpiral turn to the ham.

This muſcle ſerves to draw the thigh inwards, and likewiſe aſſiſts in its flexion.

Obturator Externus.

THIS is a ſmall flat muſcle, ſituated obliquely at the upper and anterior part of the thigh, between the pectinalis and the fore part of the foramen thyroideum, and covered by the adductor brevis femoris.

It ariſes tendinous and fleſhy from all the inner half of the circumference of the foramen thyroideum, and likewiſe from part of the obturator ligament. Its radiated fibres collect and form a ſtrong roundiſh tendon, which runs outwards, and after adhering to the capſular ligament of the joint is inſerted into a cavity at the inner and back part of the root of the great trochanter.

THE chief uſes of this muſcle are to turn the thigh obliquely outwards, to aſſiſt in bending the thigh, and in drawing it inwards. It likewiſe prevents the capſular ligament from being pinched in the motions of the joint.

SECTION XIV.

Of the Muſcles ſituated on the Leg.

THESE are the two gaſtrocnemii, the plantaris, popliteus, flexor longus digitorum pedis, flexor longus pollicis pedis, tibialis poſticus, peroneus longus, peroneus brevis, extenſor longus digitorum pedis, peroneus tertius, tibialis anticus, and extenſor proprius pollicis pedis. The ſeven firſt are ſituated at the poſterior, and the ſix laſt at the anterior part of the leg. The latter are covered by a ſtrong tendinous membrane, which in part is derived from the faſcia lata, and in part from the tendons of the muſcles that are inſerted into the patella and upper part of the tibia. Towards the lower part of the leg it grows thinner, and at length loſes itſelf in the cellular membrane on the upper ſurface of the foot. At the back part of the leg this faſcia is extremely thin.

*Gaſtrocnemius** *Externus.*

THIS muſcle, which is ſituated immediately under the integuments at the back part of the leg, is ſometimes called *gemellus*: this latter name is adopted by Albinus. Winſlow deſcribes it as two muſcles, which he calls *gaſtrocnemii*; and Douglas conſiders this and the following as a *quadriceps*, or muſcle with four heads, to which he gives the name of *extenſor tarſi ſuralis.*

THE gaſtrocnemius externus ariſes by two diſtinct heads. The firſt, which is the thickeſt and longeſt of the two, ſprings by a ſtrong thick tendon from the upper and back part of the inner condyle of the os femoris, adhering ſtrongly to the capſular ligament of the joint, between which and the tendon we find a conſiderable *burſa mucoſa.* The ſecond head ariſes by a thinner and ſhorter tendon from the back part of the outer condyle of the os femoris. A little below the joint their fleſhy bellies unite in a middle tendon, and below the middle of the tibia they ceaſe to be fleſhy, and terminate in a broad tendon, which, a little above the lower extremity of the tibia, unites with that of the gaſtrocnemius internus, to form one great round tendon, ſometimes called *chorda magna*, but more commonly *tendo Achillis.*

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* Γαστροκνημία, *ſura*, the calf of the leg, from γαστηρ, *venter*, and κνημή, *tibia.*

Gaſtrocnemius Internus.

THIS, which is ſituated immediately under the laſt deſcribed muſcle, is ſometimes named *ſoleus*, on account of its ſhape, which reſembles that of the ſole fiſh.

It ariſes by two heads. The firſt ſprings by tendinous and fleſhy fibres from the poſterior part of the head of the fibula, and for ſome way below it. The ſecond ariſes from an oblique ridge at the upper and poſterior part of the tibia, which affords origin to the inferior edge of the popliteus, continuing to receive fleſhy fibres from the inner edge of the tibia for ſome way down. This muſcle, which is narrow at its origin, ſpreads wider as it deſcends, as far as its middle; after which it becomes narrower again, and begins to grow tendinous, but its fleſhy fibres do not entirely diſappear till it has almoſt reached the extremity of the tibia, a little above which it unites with the laſt deſcribed muſcle, to form the *tendo Achillis*. This thick round chord is inſerted into the lower and poſterior part of the os calcis, after ſliding over a cartilaginous ſurface on that bone, to which it is connected by a tendinous ſheath that is furniſhed with a large *burſa mucoſa*.

Both the gaſtrocnemii have the ſame uſe, viz. that of extending the foot, by drawing it backwards and downwards.

Plantaris.

THIS long and ſlender muſcle, which is ſituated under the gaſtrocnemius externus, ariſes, by a thin fleſhy origin, from the upper and back part of the outer condyle of the os femoris. It adheres to the capſular ligament of the joint, and, after running obliquely downwards and outwards, for the ſpace of three or four inches, along the ſecond origin of the gaſtrocnemius internus, and under the gaſtrocnemius externus, terminates in a long, thin, and ſlender tendon, which adheres to the inſide of the tendo Achillis, and is inſerted into the inſide of the poſterior part of the os calcis.

THIS tendon ſometimes ſends off an aponeuroſis that loſes itſelf in the capſular ligament, but it does not at all contribute to form the aponeuroſis that is ſpread over the ſole of the foot, as was formerly ſuppoſed, and as its name would ſeem to imply.

Its uſe is to aſſiſt the gaſtrocnemii in extending the foot. It likewiſe ſerves to prevent the capſular ligament of the knee from being pinched.

Popliteus.

THIS little muſcle, which is covered by the plantaris and gaſtrocnemius externus, derives its name from its ſituation at the ham *(poples)*.

It ariſes by a broad and thick tendon from the lower part of the outer condyle of the thigh, and adheres firmly to the poſterior ſurface of the capſular ligament of the joint. In its paſſage over the joint it becomes fleſhy, and running obliquely inwards, is inſerted fleſhy into a ridge at the upper and inner edge of the tibia, about two inches below the head of that bone.

The lower half of this muſcle is covered by a thin tendinous membrane.

This muſcle ſeems to have but little power in bending the leg; but when this is done, it ſerves to roll it inwards. It likewiſe pulls the capſular ligament of the knee from between the bones.

Flexor Longus Digitorum Pedis.

THIS long muſcle, which is the *perforans* or *flexor profundus* of Douglas, is ſituated along the poſterior part and inner ſide of the leg.

It ariſes fleſhy from the back part of the tibia, immediately below the inſertion of the popliteus, ſome of its fibres being confounded with thoſe of the tibialis poſticus. After running down to the malleolus internus, its tendon paſſes under a kind of annular ligament, and then through a ſinuoſity at the inſide of the os calcis; ſoon after which we find it receiving a ſmall tendon from the flexor pollicis longus, and about the middle of the foot it divides into four tendons, which paſs through the ſlits of the flexor digitorum brevis, and are inſerted into the upper part of the laſt bone of all the leſſer toes.

About the middle of the foot this muſcle unites with a fleſhy portion, which, from the name of its firſt deſcriber, has been uſually called *maſſa carnea* Jacobi Sylvii. It may be conſidered as a portion or appendage of the flexor longus. This *maſſa carnea* ariſes by a thin fleſhy origin from moſt part of the ſinuoſity of the os calcis, and likewiſe by a thin tendinous beginning from the anterior part of the external tubercle of that bone, and ſoon becoming all fleſhy, unites with the flexor longus, juſt before its diviſion into four tendons.

The flexor longus and its appendage have both the ſame uſe, viz. that of bending the laſt joint of the toes.

Flexor Longus Pollicis Pedis.

THIS muſcle is ſituated along the poſterior part of the leg, between the laſt deſcribed muſcle and the two peronei.

It ariſes tendinous and fleſhy a little below the head of the fibula, from the back part of that bone, to which its fleſhy fibres continue to adhere almoſt to its extremity. A little above the heel it terminates in a round tendon, which after paſſing in a groove formed at the poſterior edge of the aſtragalus and the internal lateral part of the os calcis, in which it is ſecured by an annular ligament, goes to be inſerted into the laſt bone of the great toe, which it ſerves to bend.

Tibialis Poſticus.

THIS, which is a penniform muſcle, is ſituated behind the tibia and fibula, between the two laſt deſcribed muſcles.

It ariſes from the poſterior ſurface and outer edge of the tibia, immediately below the inſertion of the popliteus, and likewiſe from the adjacent part of the fibula, and from the interoſſeous ligament for ſome conſiderable way downwards, its fibres running towards a middle tendon. A little above the malleolus internus it ſends off a round tendon, which paſſes under an annular ligament in a groove behind that proceſs, and growing broader goes to be inſerted into the upper and inner part of the os naviculare, and farther on into the ſide of the os cuneiforme medium.

The uſe of this muſcle is to bring the foot inwards; it may likewiſe aſſiſt in extending it.

Peroneus Longus.

THIS muſcle, which is the *peroneus primus* of Douglas, is ſituated ſomewhat anteriorly along the outer ſide of the leg.

It ariſes tendinous and fleſhy from the external lateral part of the head of the tibia, and likewiſe from the upper anterior ſurface and outer ſide of the *perone* or fibula, its fibres continuing to adhere to the outer ſurface of the latter to within three or four inches of the malleolus externus. It terminates in a long round tendon, which runs obliquely behind the malleolus ~~in~~ternus, ex where it paſſes through a cartilaginous groove in common with the peroneus brevis, being bound down by an annular ligament. When it has reached the os calcis, it quits the tendon of the peroneus brevis, and runs obliquely inwards along a groove in the os cuboides, under the muſcles on the ſole of the foot, to be inſerted into the outſide of the poſterior extremity of the metatarſal bone that ſupports the great toe.—Near the inſertion of this muſcle we find a ſmall *burſa mucoſa.*

This muſcle draws the foot outwards, and likewiſe aſſiſts in extending it.

Peroneus Brevis.

THIS, which is in a great meaſure covered by the laſt deſcribed muſcle, is the *peroneus ſecundus* of Douglas.

It ariſes by an acute, thin, and fleſhy origin from the anterior and outer part of the fibula, its fibres continuing to adhere to the lower half of that bone. Its round tendon paſſes through the groove in the malleolus externus, along with that of the peroneus longus; after which we ſee it running in a ſeparate groove to be inſerted into the upper and poſterior part of the tubercle at the baſis of the metatarſal bone that ſupports the little toe.

Its uſe is to aſſiſt the peroneus longus.

Extenſor Longus Digitorum Pedis.

THIS muſcle, which is ſituated along the anterior and outer part of the tibia, ariſes by a thin, narrow, tendinous and fleſhy beginning, from the upper, anterior, and outer part of the tibia, cloſe to the origin of the peroneus longus; from the interoſſeous ligament; and from the inner edge of the fibula, to which it continues to adhere almoſt its whole length. Many of its fibres are derived likewiſe from the adjacent tendinous faſcia. It terminates in a long tendon, which paſſes under the annular

lar ligament of the tarſus, and ſplits into four portions, which are inſerted into the root of the firſt joint of each of the ſmall toes, and ſpread over their upper ſurface, as far as the beginning of the laſt joint.

The uſe of this muſcle is to extend the toes into which it is inſerted.

Peroneus Tertius.

THIS is the name given by Albinus to a muſcle, which, by ſome writers, is called *nonus Veſalii*, or Veſalius's ninth muſcle of the foot. It is ſituated at the anterior, inferior, and outer part of the leg, along the outer edge of the laſt deſcribed muſcle, to which it is intimately united.

It ariſes fleſhy from the anterior ſurface of the lower half of the fibula, and from the adjacent part of the interoſſeous ligament. Its fibres run obliquely downwards, towards a tendon which paſſes under the annular ligament, and then running obliquely outwards, is inſerted into the root of the metatarſal bone that ſupports the little toe.

THIS muſcle aſſiſts in bending the foot.

Tibialis Anticus.

THIS muſcle, which is ſituated obliquely immediately under the integuments at the fore part of the leg, ariſes, tendinous and fleſhy, from the upper and anterior part of the tibia, cloſe to the origin of the extenſor longus digitorum pedis. It runs down fleſhy on the outſide of that bone, receiving many of its fibres from the interoſſeous ligament and adjacent tendinous faſcia, and terminates in a round tendon, which paſſes obliquely under the annular ligament near the malleolus internus, and is inſerted into the inner edge of the os cuneiforme internum, from whence it ſends off a ſmall portion, which extends as far as the poſterior end of the metatarſal bone of the great toe. Between the tendon of this muſcle and the os cuneiforme, we find a ſmall *burſa mucoſa.*

This muſcle bends the foot, by drawing it upwards and inwards.

Extenſor Proprius Pollicis Pedis.

THIS muſcle, which is the *extenſor longus* of Douglas, is almoſt entirely covered by the tibialis anticus and extenſor longus digitorum pedis, between which it is ſituated.

It ariſes, tendinous and fleſhy, from the anterior and upper part of the fibula, a little below the head of that bone, to the anterior ſurface of which, and to the adjacent interoſſeous ligament, it continues to adhere for the ſpace of five or ſix inches. Its fibres run obliquely downwards, towards a tendon which paſſes under the annular ligament, from whence it runs in an oblique direction, to be inſerted into the convex ſurface of the bones of the great toe, which it ſerves to extend.

SECTION XV.

Of the Muſcles ſituated on the Foot.

THESE are the extenſor brevis digitorum, flexor brevis digitorum, abductor pollicis, abductor minimi digiti, lumbricales, flexor brevis pollicis, adductor pollicis, tranſverſalis, flexor brevis minimi digiti, and interoſſei externi & interni. Of this number, the extenſor brevis digitorum and interoſſei externi are ſituated on the upper ſurface of the foot; all the reſt are placed on its under ſurface. The latter are covered by a ſtrong tendinous faſcia, called *aponeuroſis plantaris*, which is extended over the ſole of the foot, from the inferior and poſterior part of the os calcis, where it is thickeſt, to the firſt joints of all the toes.

Extenſor Brevis Digitorum Pedis.

THIS is a ſhort fleſhy muſcle, ſituated on the upper ſurface of the foot, and extending obliquely under the tendons of the extenſor

tenſor longus, from the upper, anterior, and outer part of the os calcis, to the toes.

It ariſes, by ſhort tendinous fibres, from the fore and upper part of the os calcis externally, near where it joins the os cuboides, and likewiſe from part of the adjacent annular ligament. It ſoon forms a fleſhy belly, eaſily diviſible into four portions, of which the two innermoſt are the thickeſt and ſhorteſt, and the two outermoſt the thinneſt and longeſt. Theſe portions terminate in four ſlender tendons, one of which unites, at the firſt joint of the great toe, with the tendon of the extenſor longus pollicis; the other three unite, in the ſame manner, with three tendons of the extenſor digitorum longus.

The uſe of this muſcle is to aſſiſt in extending the four toes into which it is inſerted.

Flexor Brevis Digitorum Pedis.

THIS muſcle, which is the *perforatus*, or *flexor ſublimis* of Douglas, ariſes, by a narrow tendinous and fleſhy, beginning, from the inferior protuberating part of the os calcis. It likewiſe derives many of its fleſhy fibres from the adjacent tendinous membrane, and ſoon forms a thick belly, which divides into four portions. Each of theſe portions terminates in a flat tendon, the fibres of which decuſſate, to afford a paſſage to a tendon of the flexor longus, and afterwards reuniting, are inſerted into the ſecond phalanx of each of the four leſſer toes.

THIS muſcle ſerves to bend the ſecond joint of the toes.

Abductor Pollicis Pedis.

THIS muſcle, which is the *thenar* of Winſlow, is ſituated along the inner edge of the foot. It ariſes, tendinous and fleſhy, from the inſide of that large tuberoſity of the os calcis which forms the heel, and likewiſe from the ſame bone, where it unites with the os naviculare. About the middle of the metatarſal bone it terminates in a tendon, which, after paſſing over the internal ſeſamoid bone, is inſerted into the root of the firſt joint of the great toe.

This muſcle draws the great toe from the reſt, and at the ſame time bends it a little.

Abductor Minimi Digiti.

THIS, which is deſcribed as two muſcles by Winſlow, under the names of *parathenar major* and *metatarſeus*, is ſituated along the outer edge of the foot.

It ariſes, tendinous and fleſhy, from the anterior ſurface of the external tubercle of the os calcis, from the root of the metatarſal bone of the little toe, and likewiſe from the aponeuroſis plantaris. It runs along the metatarſal bone, and terminates in a tendon, which is inſerted into the root of the firſt joint of the little toe externally.

Its uſe is to draw the little toe outwards from the reſt, and likewiſe to bend it a little.

Lumbricales Pedis.

THESE muſcles, in their ſhape, ſituation, and number, reſemble the lumbricales of the hand. They ariſe, tendinous and fleſhy, from the tendons of the flexor longus digitorum pedis, and terminate in four long, ſlender tendons, which, after running over the inſide of the firſt joint of the four leſſer toes, are inſerted into the expanſion that is formed by the extenſor tendons and covers the upper part of the toes.

The firſt lumbricalis, or that which is next to the great toe, is ſomewhat thinner and longer than the other three, and ariſes from the inner ſide and upper ſurface of the firſt tendon of the flexor longus. The other three, as in the hand, ariſe each from between two tendons.

These muſcles draw the toes inwards, towards the great toe; they likewiſe aſſiſt in bending the firſt joint, or in extending the two laſt joints of the toes into which they are inſerted.

Flexor Brevis Pollicis Pedis.

THIS muſcle, which is ſituated upon the metatarſal bone of the great toe, ariſes tendinous from the under and anterior part of the os calcis, and from the under part of the os cuneiforme externum. It ſoon becomes fleſhy and diviſible into two portions, which do not ſeparate from each other till they have reached the anterior extremity of the metatarſal bone of the great toe, where they become tendinous, and then the innermoſt portion unites with the tendon of the abductor, and the outermoſt with that of the adductor pollicis. They adhere to the external os ſeſamoideum, and are finally inſerted into the root of the firſt joint of the great toe,

THESE two portions, by their ſeparation. form a groove, in which paſſes the tendon of the flexor longus pollicis.

The uſe of this muſcle is to bend the firſt joint of the great toe.

Adductor Pollicis Pedis.

THIS muſcle, which is the *antithenar* of Winſlow, is obliquely ſituated at the bottom of the foot. It ariſes tendinous from near the roots of the metatarſal bones of the ſecond, third, and fourth toes, and from the adjacent ligaments, and, after forming a broad fleſhy belly, runs obliquely forwards and inwards, and growing narrower, terminates in a tendon, which, after adhering to a portion of the laſt deſcribed muſcle, is inſerted into the external os ſeſamoideum, and ſometimes into the firſt joint of the great toe.

Its uſe is to draw this toe nearer the reſt; and likewiſe to aſſiſt in bending it.

Tranſverſalis Pedis.

THIS little muſcle, which ſeems to have been firſt deſcribed by Placentinus [*], derives its name from the tranſverſe direction of its fibres.

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[*] Tabul. Anatomic.

It ariſes tendinous and fleſhy from the under and outer part of the anterior extremity of the metatarſal bone of the little toe, and from the ligaments of the two next toes; and, uniting with the tendon of the adductor pollicis, is inſerted into the internal ſeſamoid bone, and the under part of the anterior extremity of the metatarſal bone of the great-toe.

Its uſe is to contract the foot, by bringing the heads of the metatarſal bones nearer to each other.

Flexor Brevis Minimi Digiti Pedis.

THIS little muſcle, which is the *parathenar minor* of Winſlow, is ſituated along the inferior ſurface and outer edge of the metatarſal bone of the little toe. It ariſes tendinous from the baſis of that bone, and from the ligaments that connect it to the os cuboides.

boides. It ſoon becomes fleſhy, and adheres almoſt to the whole length of the metatarſal bone, at the anterior extremity of which it forms a ſmall tendon, which is inſerted into the root of the firſt joint of the little toe.

Its uſe is to bend this toe.

Interoſſei Pedis.

THESE ſmall muſcles in their ſituation between the metatarſal bones reſemble the interoſſei of the hand, and like them are divided into *internal* and *external*.

The *interoſſei pedis interni* are three in number. They ariſe tendinous and fleſhy from the baſis and inſide of the metatarſal bones of the middle, the third, and the little toes, in the ſame manner as thoſe of the hand, and they each terminate in a tendon that runs to the inſide of the firſt joint of theſe toes, and from thence to their upper ſurface, where it loſes itſelf in the tendinous expanſion that is ſent off from the extenſors.

Each of theſe three muſcles ſerves to draw the toe, into which it is inſerted, towards the great-toe.

The *interoſſei externi* are four in number. The firſt ariſes tendinous and fleſhy from the outſide of the root of the metatarſal bone of the great-toe, from the os cuneiforme internum, and from the root of the inſide of the metatarſal bone of the fore-toe. Its tendon is inſerted into the inſide of the tendinous expanſion that covers the back part of the toes.

The ſecond is placed in a ſimilar manner between the metatarſal bones of the fore and middle-toes, and is inſerted into the outſide of the tendinous expanſion on the back part of the fore-toe.

The third and fourth are placed between the two next metatarſal bones, and are inſerted into the outſide of the middle and third-toes.

The firſt of theſe muſcles draws the fore-toe inwards towards the great-toe. The three others pull the toes, into which they are inſerted, outwards. They all aſſiſt in extending the toes.

THE END OF THE FIRST VOLUME.